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FOR A EUROPEAN UNION ENERGY POLICY

Green Paper

(presented by the Commission)

FOR A EUROPEAN UNION ENERGY POLICY

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SUMMARY AND POLICY DIRECTIONS

Energy is central to economic and social activity in the industrialised world. Therefore the conditions of supply, transport, distribution and consumption of energy are of interest to all.

For countries in transition or in the process of industrialisation, energy is one of the driving forces of their economic development and can contribute indirectly to their political stability.

The establishment of an energy policy involves a complex set of factors, imperatives and interests. Every decision in that framework must be based on an evaluation of the relative priority of each of those factors, imperatives and interests.

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The preparation of a **Green paper on energy policy in the European Community** is the most appropriate method of launching the policy discussion, as it will allow all interested parties contribute to the debate.

Clearly the energy industry plays a central role in the operation of the energy market. It is the energy industry that has to assume the political, financial and technical risks associated with energy investments.

Just as energy prices play an important role in overall industrial competitiveness, members of the public, both at work or in their daily life, will also be affected by choices made regarding fuel type and conditions of energy use. Companies, workers and the general public must therefore be given the opportunity to contribute to the debate through their organizations and their representatives.

Whatever the energy resources of each Member State and whatever their respective energy balance, the Community as a whole has to respond to the challenges of industrial competitiveness, security of supply and environmental protection. The energy policy of the Community has to answer these challenges and optimise the diversity of national and regional energy portfolios for the overall benefit of the Community.

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OBJECTIVES OF THE GREEN PAPER

The Green Paper aims to provide the European Institutions with the basis for evaluating whether or not the Community has a greater role to play in energy.

The principal challenges with which the Community will be confronted in future years are examined (Annex A). The geopolitical constraints are identified, as are the constraints that result from the pressures of economic and social cohesion and from the requirements of environmental protection. The impact of potential major developments such as technological changes is also assessed.

The current energy situation and future prospects forms the basis for the analysis (Annex B). A common vision is needed of the challenges which will affect the supply, production and consumption of energy over the next 20 years. This will define the main principles of Community energy policy and the logic for its implementation.

The Commission will exercise its responsibilities in the energy sector only on the basis of a consensual and widely debated analysis of the issues. This analysis and debate of the issues will be carried out by the Commission, as appropriate, and should make full use of existing European analytical capabilities.

Finally, the Green paper analyses the **current responsibilities** of the Community in the energy field (Annex C).

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THE ESSENTIALS OF ENERGY POLICY

The energy policy objectives for the Community are appraised in terms of the challenges identified.

These objectives are readily apparent involving, as they do, the management of policy to ensure the satisfaction of all users needs at the least cost while meeting the requirements of security of supply and environmental protection.

But these objectives are contradictory. The difficulty will be to balance the different elements in such a way that the essential objectives can be satisfied. What the Green paper proposes for debate therefore is how to attain these objectives within the framework of an integrated European market.

In parallel the Green paper seeks to contribute to the definition of a new framework for the sector which would accommodate continuing changes and, at the same, time contribute towards the overall competitiveness of our economies.

By setting out a flexible and more effective environment for the energy sector and a tax structure which favours environmental protection and employment, this paper contributes positively to the debate opened by the **Commission's White Paper on competitiveness, growth and employment.**

POLICY DIRECTIONS

In the preparation of the Green paper, gaps and deficiencies in the current position became apparent and policy directions were indicated which would, in time, improve the situation.

These policy directions point the following ways:

(1) It is evident that **there is a clear need to reinforce the level of concerted action and cooperation** between the decision makers and the operators of energy policy within the Community.

Independent of the institutional decision-making process within the Community, there is a need for collective prioritisation of political actions at both the Community and national level. This prioritisation must be based on cooperation and concerted action. However, the framework and mechanisms for it are missing.

The aim of this concerted action and cooperation should be to assist in the convergence of national and Community policies. But informal mechanisms cannot give the legal and political guarantees (especially on transparency) necessary for the expression of the Community dimension in national energy policies.

(2) Secondly, **national and Community energy policies should be approached in a comprehensive way** because their effectiveness depends on their consistency and because numerous factors influencing these policies are, by their nature, trans-national.

This is a fact of the operation of the market, particularly so in the context of the requirements of the Community's internal market. Aiming at the strengthening of competitiveness by the introduction of competition in those sectors in which monopolies persist, the completion of the single market must therefore find a balance between the satisfaction of the common requirements of consumer protection, security of supply and environmental protection.

In this context, it will be necessary to draw conclusions from the clearer distinction that now exists in certain Member States between regulatory and management responsibilities for energy networks. This is required in order to organize cooperation between the regulatory authorities at the Community level and in order to ensure a common approach to the concept of general economic interest.

But this is equally valid if one considers the interdependence between fuels. Only a global approach to the imperatives of security of supply would allow an appropriate response at a reasonable political and economic cost.

The foreign policy of the Community needs to have security of energy supply as an objective. Questions of supplies form part of the general context of the external economic and commercial relations for which the Community has responsibility and

are also central to the strategy of all companies operating in the framework of a single internal market.

(3) As far as the Community framework is concerned, the analysis reveals that the coherent development of policy instruments is hindered by the **absence of clear responsibilities for energy policy at Community level**.

These responsibilities for energy policy are recognized in the field of coal and nuclear power. By contrast the Treaty of Rome does not embrace a similar responsibility for the other sources of energy.

(4) Finally, regarding the environment, the analysis stresses that there are two main challenges. One results from traditional forms of pollution. The other arises from the risk of climate change linked to the emission of greenhouse gases and for which the use of fossil fuels is largely to blame.

In relation to the traditional forms of pollution, the Community has already made considerable progress and new measures are being progressively adopted. Similar initiatives in the third world offer an important and increasing mutual benefit, in so far as the potential for energy efficiencies and savings is far greater than in the industrialised world, thus justifying an energy cooperation effort of mutual benefit.

The aims of any such cooperation cannot only be the implementation of agreements, the transfer of technological expertise or the financing of projects. It must also assist recipients in their pursuit of the objectives of increased competitiveness, greater security of supply and strengthened environmental protection. It has also to increase their capacity to cope with their energy problems without weakening the quality of the economic development of the countries concerned.

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I. RECENT DEVELOPMENTS IN COMMUNITY ENERGY POLICY

1.1 Objectives and methodology of the Green paper

The Green Paper is being published in response to important changes in the legal, institutional and economic environment of the European Community:

- Since 1 January 1993, European companies have been operating in a single market in which the free movement of goods, services, capital and people is assured. This single market applies as much to the energy sector as any other. However, while implementing the rules of the Treaty to allow the completion of the single market for both the energy industry and energy consumers, the Community must take due note of public interest obligations;

- the Commission has committed itself to submitting to the 1996 Intergovernmental Conference on the amendment of the Treaties, a report on the possible inclusion in the amendments of specific requirements in relation to energy;

- the energy sector is entering a period of far-reaching changes marked by increasing dependence of the European Community on energy, by the constraints of environmental protection arising from rising energy consumption and by the geopolitical changes affecting both supplies to the Community and consumption patterns.

- Article 2 of the Treaty on European Union set an objective of *sustainable and non-inflationary growth while respecting the environment,* an objective which will most certainly have important consequences for energy policy.

The wide-ranging debate opened by the publication of this Green paper, the drafting of which has already benefited from detailed discussions with national administrations, industry players and social partners[1], will enable the Community to set new energy policy goals which will serve as a frame of reference for the actions of the Community and of its Member States. Moreover, it will make it possible to evaluate the distribution of national, regional and Community responsibilities and to establish the respective role of public authorities and industry. The preparation of this Green paper has also benefited from the contribution of the

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(1) The green paper takes into account the views communicated by UNICE, IFIEC, CES, CEEP, EUROPIA, E&P FORUM, UPEI, the coal importers, CEPCEO, COGEN Europe, EUROGAS, EURELECTRIC, Electricity Association, as well as FORATOM.

Economic and Social Committee which organized a series of hearings in 1993-94 to establish an opinion based on the report submitted by Mr Gafo Fernandez[2].

3. As a result of this debate the Commission will publish a White Paper in 1995 which will establish a working plan for energy in the Community. This working plan will aim to utilise existing policy instruments which can contribute to the implementation of energy policy goals and promote cooperation between Member States and the energy industry.

1.2 Energy policy to date

4. Community energy affairs were originally dealt with by the ECSC and EURATOM Treaties. It was not until 1974 that the need for an energy policy strategy arose[3]. Since then, energy policy has in general focused on reducing the consequences of oil supply crises.

In 1983, the Council considered that the Community need to define common energy objectives, stressing the need for Community coordination, the strengthening of national operations and the launching of specific Community actions.

In 1986, the Council adopted a strategy based on horizontal and sectoral objectives[4] for 1995; actions were to be carried out both at a Community level and by the Member States individually. Progress was made towards the achievement of the horizontal objectives. However, because of changing economic conditions, particularly the drop in oil prices in 1986, developments in energy market trends and the energy implications of growing environmental awareness, it has not proved possible to attain the sectoral objectives. For renewables, quantitative targets are set for the year 2005 by the ALTENER programme[5].

1.3 The institutional framework

5. While the production and marketing of various energy forms are very interdependent, energy policy has to be developed within widely differing institutional frameworks. For example, electricity production is influenced by policy instruments developed under the ECSC and EAEC Treaties for coal and nuclear energy and by the instruments available in the EC Treaty for the renewable energy and hydrocarbons.

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(2) Opinions of the energy, nuclear questions and research Sections of the Economic and Social Committee on the Community energy policy document ESC 919/93 of 3 August 1994

(3) Council Resolution of 16 September 1986 concerning new energy policy goals and the convergence of the Member States policies - 86/C 241/01

(4) Council Resolution of 17 September 1974 concerning the new energy policy strategy for the Community. OJ C153 of 9 July 1975.

(5) Decision 93/500/EEC of 13 September 1993, OJ L235 of 19 September 1993, page 41

6. The ECSC Treaty created a common market for coal and steel with common objectives and common institutions; its objectives included ensuring that customers have equal access to sources of production; encouraging undertakings to improve their productive potential; and to promoting the growth of international trade. A number of practices were declared incompatible with the common market such as import and export duties or discriminative and restrictive measures. At present, state aids are authorised through Article 95 of the ECSC Treaty, only if they help to achieve further progress towards economic viability with the aim of subsequently reducing aid; solve the social and regional problems created by industry closures; or help the coal industry adjust to environmental protection standards.

7. The EAEC Treaty aims to consolidate individual efforts and facilitate the development of a powerful nuclear industry by encouraging investments in Member States, periodically publishing indicative programmes reflecting this objective, providing for research, disseminating knowledge for health protection, ensuring supplies come through the Supply Agency, setting safeguards (such as guaranteeing peaceful uses), and controlling safety and external relations. Recently the financial authority of EURATOM was increased to cover possible loans aimed at improving the safety and efficiency of the nuclear parc in East European countries.

8. The provisions of the Treaty of the European Union which impact on the energy sector essentially concern the operation of the internal market, including rules on competition, economic and social cohesion, the development of trans-European networks, commercial policy, cooperation with third countries, environmental protection and research and consumer policy.

1.4 Energy policy in the context of other relevant policies

Energy policy cannot be developed independently from other policies and activities of the Community:

- The implementation of the Commission's White Paper on a common transport policy [6] will influence oil consumption by improving infrastructures and their use.

- The White Paper on growth, competitiveness and employment aims to give the energy sector a more flexible and more effective regulatory environment[7].

- By establishing priorities for actions to improve operation of the market and for infrastructure investments, the Communication on industrial competitiveness[8] will impact equally on energy providers and consumers, particularly encouraging research and development initiatives and broadening competition.

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(6) COM (92) 494 final of 2 December 1992

(7) COM (93) 700 final of 5 December 1993

(8) COM (94) 319 final of 14 September 1994

1.5 The shaping forces for energy

10. The many influences which shape the energy sector are documented in annex A. The geopolitical context is particularly important. The production and trade of energy is largely conducted on an international scale either because the participants are multinational corporations and governments, or because the resources are mostly located in one region and the markets in another.

11. The specific characteristics of the separate energy markets are determined by the nature of the different fuels, by the technology employed and by the constraints particular to each sector. For example, Community coal is uncompetitive compared with imported coal, the gas sector mostly operates on a closed monopolistic market basis, and there is a lack of consensus regarding the future of nuclear energy. Renewable energy makes a positive contribution to the double problems of growing energy imports and energy related environmental damage; however, given the relative immaturity of this sector, the scale of the benefits achieved to date is limited.

    Further economic and technical development will be enhanced by greater integration of the energy markets of the Community, which is why it is necessary to ensure that these markets operate in conformity with the provisions of the Treaties.

12. Individual Member States energy policies are closely linked to, and influenced by, their specific resource endowment. As a result there are major disparities between the energy balances of the different Member States. From a Community perspective this divergence may not be a bad thing. At the same time there is broad agreement between the Member States on the overall policy objectives; diversification of energy sources, a greater role for market forces and the reinforcement of energy efficiency efforts. The net result is the provision of a varied energy balance relying on many different sources of energy when viewed on a Community level.

13. Technology developments play a significant role in the energy sector. The influence on security of supply was demonstrated by an often quoted example from the North Sea. When the price of oil halved in 1986 it proved possible, contrary to all predictions, to continue to produce oil and gas profitably from the North Sea. This was because technological progress, in terms of increased automation and improved production systems, allowed a much lower production cost than originally forecast when the North Sea fields were first developed. Technology also is a key to greater environmental protection and better energy efficiency. The dissemination of new energy technology in the developing regions of the world can have a major impact given the prospects for growth of energy consumption in these countries. Finally the technological sophistication of the Community's energy sector is an important determinant of market share, both in the Community and outside, and contributes towards the development of a coherent industrial policy.

14. The use of any energy resource poses, almost inevitably, environmental impact problems at every phase of the operation, be it production, transport or consumption. Difficulties can be

specific to the type of energy, for example radioactive waste or sulphur emissions, or they can be common to many energy forms, as are CO_2 emissions. It is therefore accepted that the technical and economic development of the energy sector cannot be properly progressed without integrating environmental protection into an overall strategic approach. Only such a strategy can guarantee an effective result while taking into account the well known concerns of the ordinary citizen which have been documented via numerous opinion polls.

15. The different regions of the Community are not equally endowed in terms of energy supplies. In particular the disadvantaged regions are more dependent on imports than the Community average. The strengthening of infrastructures, progress in energy efficiency and the use of renewable energy would make it possible to correct regional imbalances by favouring economic development and contributing to regional planning.

1.6. Energy prospects

16. Energy policy must be framed in the context of the longer term outlook in order to influence the pattern of energy related investments, particularly for production and transport. Such major energy investment decisions do not produce results for many years and are therefore required to anticipate developments in the energy sector. Consequently, companies and public authorities should consider the study of energy prospects to be an integral component of energy policy itself.

Building on studies carried out in 1992, the Commission services developed an evaluation of energy prospects in consultation with industry organizations, university research centres and national administrations. A broad outline is presented in annex B.

The analysis confirms that the driving forces of the future for energy are demographics, changes in user behaviour, the level of economic activity, structural changes and technological developments.

17. This work focuses mainly on the European twelve but is only little changed by the accession of the new Member States, is attached. The main results can be summarized as follows:

- the highest energy consumption growth rates will be in the developing countries - so much so that by 2020, these countries could account for more than half of total world demand and CO_2 emissions;

- technological changes could limit the increase in consumption in the developed countries thanks to greater energy efficiency, although the potential for greater energy efficiency gains will remain;

- the physical availability of energy does not seem to be likely to create constraints between now and 2020; however, the fuel mix could be strongly influenced by environmental, technological and geopolitical uncertainties;

- energy consumption in the European Community will grow slowly (1% a year) but the structure of demand could change in favour of oil and gas. However, environmental constraints could encourage increasing gas consumption which could grow by 60% between now and 2020;

- the energy dependence of the European Community could increase from around 50% at present to 70% by 2020. Dependence on gas imports will increase most rapidly.

- While the development of the energy supply mix is uncertain because it can be affected by so many variables, it is clear that the nature of the demand for energy services will change. Increasingly it will be private individuals, either at home, in their cars, or at work in the office or small and medium-sized industries who will determine the pattern of demand. Traditional, high energy-consuming, heavy industry will play a less prominent role.

- The effective operation of the internal energy market will pass low cost advantages through to end users and present the widest possible energy choice to all involved.

- There will be increasing interdependence between Europe, as a large energy user, and its near neighbours Russia, the Middle East and North Africa, as large energy exporters. The energy dimension of the geopolitics and geoeconomics of the region will be of increasing importance, offering opportunities for energy investments in both directions.

1.7 Community policy

18. The Community has responsibilities concerning energy. These responsibilities are exercised by the implementation of the instruments provided for in the Treaty. Although these instruments are not integrated within a distinct energy policy set out in the Treaty, they nevertheless have to be used with the intention of achieving effectiveness and coherence. Annex C highlights in detail the application of these various policies and their effects to date on energy.

19. It is evident that two Community policies are of particular importance for the energy sector. Of prime importance is the establishment of the internal energy market, by the setting of common rules and by the removal of barriers, whether of public or private origin. This policy is consistent with the objective for the single market as fixed by the Single European Act, which aims to ensure that energy is made available in the most economic manner to end-users, whether high energy-consuming industries or private individuals. The anticipated economic advantages of the internal market will therefore be an important factor in improving the competitiveness of the economy of the European Community. The internal energy market particularly needs to be established in the gas and electricity sectors while the process of harmonisation and standardisation must be actively pursued to ensure free competition.

20. Secondly, foreign policy is of key importance because it is likely to influence the availability of energy from external sources on which the Community depends for approximately 50% of its supplies. The various cooperation agreements available and the growing role of commercial policy accompanying the internationalisation of markets, will remain important in this context.

21. Moreover, existing financial contribution policy instruments are at the disposal of energy policy. In particular there are the support programmes for research and technology development such as the framework programme or the promotion programmes for non-nuclear energy technologies. There are also various financial instruments for regional policy and for the economic and social dimension.

22. Finally, Community policies allow various regulatory interventions. Examples include environmental policy (such as the large combustion plant directive), standardization or specific energy instruments envisaged under the SAVE and ALTENER programmes.

II. FUTURE ENERGY POLICY OBJECTIVES

23. The Treaty on the European Union, in chapter I (Article B) and in articles 130a and b and 129b-2, sets a number of objectives which determine the general policy framework, including those of the energy sector:

- the promotion of "economic and social progress which is balanced and sustainable, in particular through the creation of an area without internal frontiers....and through the establishment of economic and monetary union". The availability of energy at the best price and under the best conditions governs this economic progress and strengthens the overall competitiveness of the Community. The convergence of energy policies is a factor in the convergence of economic policies - demonstrated in an inverse way by the reactions to the various past oil crises.

- The "sustainable" nature of economic and social progress desired by the Treaty comes from the incorporation of the environmental dimension into other policies. However, the conditions of energy use will govern this dimension; energy policy, while preserving economic equilibrium, has to contribute to environmental protection, both within the Community and in developing countries.

- The growing stature of the Community on the international scene "in particular through the implementation of a common foreign and security policy" also impacts on the energy sector which stands at the crossroads of economic and political international relations. Indeed energy contributes to the security of the Community by stabilizing political and economic relations with producer countries and by ensuring safe energy transit.

- The strengthening of economic and social cohesion and access to island, peripheral and isolated regions by the trans-European networks should be included in energy policy actions. This is because energy is a factor of economic and social cohesion, as is evident from the existing discrepancy in energy prices and energy intensity in these regions compared with the central regions of the Community.

24. The definition of the objectives of Community energy policy must fall within this general context. With respect to the principle of subsidiarity, the definition of these objectives addresses two requirements:

- the Community has many instruments which directly or indirectly influence energy policy and which have therefore to be used in a way consistent with common energy objectives;

- the role of the Community is to prevent distortions resulting from contradictory policies of the Member States and so the common objectives must lead to an ever closer convergence of national policies.

2.1 Overall competitiveness

The search for competitiveness will drive any common energy policy because:

- ***it gives companies in the sector the international dimension necessary for security of supply;***
- ***it ensures the development of the whole economy.***

Competitiveness results from:

- ***a well functioning internal market;***
- ***a minimum of regulation;***
- ***an appreciation of the growing economic value of energy efficiency***

25. As a result of the development of the service sectors of Western economies and efforts to reduce energy intensity in the European Community, energy represents a smaller and smaller share of GDP. However, it still has a strategic place in the economy as well as being a key raw material, even though its role is becoming less strategic because of the increasing development of international trade and the interdependence of economies. Nevertheless, the supply of certain fuels is critical upon the circumstances of certain producers. Consequently, the economic development of Europe depends on the stability of our relations with these suppliers.

26. The total net cost of Community energy imports currently accounts for less than 1.5% of GDP, mostly for petroleum products. This relatively low level has come about by the development of energy efficiency, which has increased by 25% since 1970, and by a reduction in dependence on imported oil and petroleum products, which has reduced by more than 50%. Our economies are therefore much less vulnerable than they were twenty or so years ago to an increase in the prices of energy and energy imports. Nevertheless, according to economic surveys carried out after the Gulf war, a doubling of the price which the Community pays for its oil imports could have significant negative effects on the economy. This would be especially so if it were not accompanied by measures mitigating this increase via other economic factors (wages, etc.) and if macro-economic policies were to diverge within the Community[9]. The latter element clearly shows the linkage between the convergence of economic policies in the context of the Treaty on European Union and the convergence of energy policies.

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(9) European Economy No.46

Macro-economic impact

27. As a factor of production, energy contributes to the overall competitiveness of the European Community. However, overall competitiveness is not only measured by industrial productivity but also by the economic well-being of individuals. This well-being undoubtedly depends on the quality of the environment and, in this context, on the energy intensity of economic and industrial activity. But this well-being also depends on the availability of energy at the least cost, a factor of industrial competitiveness. It would be useless to reduce the share of energy in economic activity if it hindered job creation.

28. Energy is also an important element of global competitiveness. In this context, it should be noted that the report on the European Round Table of Industrialists dated November 1994, concluded that the cost of energy for European Industry is 30% higher than in the United States, thus highlighting the comparative advantages which would result from an opening up of the European energy market.

The contribution of energy to the overall competitiveness of the Community is determined by two interdependent factors: its availability in various forms and its price.

- The two oil crises of 1973 and 1980 showed that the macro-economic impact of a severe price increase can be very considerable. The economic difficulties that followed these external disturbances were considerably worsened by the different and uncoordinated measures implemented by Member States. The European Community of 1994 is no longer in the same situation as 1973, the result of the development of several factors, notably a reduction in energy intensity and a lower oil import dependency resulting from increased domestic production from the North Sea.

- However, changes in the energy supply/demand balance often result in price movements on world markets. In this context, the price of oil plays a vital role because other energy prices are directly related to it. It is only in the medium to long term that other energy resources will be able to assume this role, provided that their use is sufficiently widespread.

29. From a macro-economic point of view, two elements are essential:

- first of all, changes in energy prices lead to changes in the part energy plays in the production process. Substitution generally reduces the impact of energy costs; hence, the economy shifts towards other factors of production, thus improving energy efficiency and contributing to the creation of new markets which benefit from industrial competitiveness.

- Then, as a significant proportion of energy used is imported, increases in its price lead to losses in real disposable income. There is a net loss of resources from the national economy (the terms of trade effect) equivalent to the loss of disposable income. It is important to stress that whereas increases in energy prices induce substitution effects, only increases in the import price cause a "terms of trade" effect. If because of insufficient political coordination the loss in disposable income is not reflected by a

fall in real wages, the macro-economic effects are even worse. There is therefore a fundamental difference between a sudden increase in energy prices following a crisis in the international markets, and a change in the price of energy to the final consumer resulting from taxation. In this latter case, there is no transfer to countries outside the Community, provided that the change of prices does not affect industrial competitiveness.

Industrial impact.

30. Excluding both nuclear power (the price of which is only a small part of final demand) and renewable energy, the three main conventional kinds of energy are all dependent on the international context. Prices before tax are fixed in the international marketplace where the Community, as a consumer, has little weight. In the case of gas, contracts are often concluded with prices fixed to those of competing energy sources, sometimes even including taxation (e.g. heating oil). Consequently the price of energy is a world price.

31. It is therefore the tax and regulatory framework of energy consumption which will determine the terms of international competition by influencing industrial production costs. On average, the majority of manufacturing sectors have a relatively low direct energy cost, varying from zero to 5% of production costs[10]. However, some sectors have an average energy cost of between 10% and 20%. These are the heat and electricity industries, parts of mineral extraction, primary industrial production and the iron and steel industry. Many other sectors have energy costs at the intermediate level of between 5% and 10%. In terms of employment, these last two categories of industry account for approximately 3.8 million people, i.e. 13% of the total industrial workforce.

32. It is in this context that the impact on competitiveness of an increase in the cost of energy must be viewed. Industry (UNICE, IFIEC) considers that an increase in the energy price, for example under cost internalisation, will harm industrial competitiveness. The absolute share of energy in total production costs has been reduced so much that the fears expressed by industry are excessive. However, analysis of this problem cannot ignore the fact that energy efficiency requires investment. This investment may be jeopardized where costs are increased. Indeed, the competitiveness of a company must be evaluated in relation to its competitors and their costs; in this respect, under present social circumstances the labour intensive sectors would be most vulnerable. Therefore, measures to internalise external costs must be approached within the framework of global reform of company taxation, taking into account the aim of reducing the fiscal burden[11]. Particular attention must be paid to the small and medium-sized enterprises (SMEs), accounting for the specific constraints of such businesses - notably of a financial nature - compared to larger concerns and the essential role which the SMEs play in industrial competitiveness and employment within the Community.

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(10) European Economy No 51 - May 1992

(11) Communication "Economic growth and environment, some implications for economic policy making" - COM (94) 465 of 3 June 1994

33. In a general way, the role of energy in the competitive position of companies must be considered from two points of view:

- If progress in the management of energy use during the period 1973-1986 is explained by rationalization and by investments in the modification of manufacturing processes in order to reduce consumption, then it would seem that since then, more fundamental investments to improve quality, performance and, to a lesser extent, energy saving explain progress made. One of the major drivers of energy intensity gains is industrial investment, illustrating the link between energy efficiency and a favourable climate for investment.

- The dynamics of the competitiveness of our large energy consuming industrial sectors vis-à-vis traditional industrial competitors (USA and Japan) and the new, emerging competitors (South-East Asia) must be examined. According to recent studies[12], the prospects for market growth for the large consuming sectors (glass, chemicals, papers, cement, aluminium etc.) in the Community can be regarded as average, relative to both their recent performance and the expected future performance of the Community. It is therefore probable that the development of the large consuming sectors will be characterised by a growth in investment in countries in the process of industrialisation, that is to say in more promising markets than those of the Community. At the same time, these same sectors will have to face increased competition in their domestic markets from companies that will not be subject to the same constraints on production. The growth of these external markets and the competitive constraints on the internal market could lead to a relocation of investment.

Taxation

34. Taxation of petroleum products plays a central role in energy policy in that it influences users choice and can therefore have long term effects on the energy balance. This is particularly the case for excise duties on mineral oils.

Within the framework of the creation of the internal market, the Council set up common structures[13], a common system of minimum rates[14] and rules governing movement of products subject to excise duties[15]. Pursuant to the Directive on minimum rates, every two years the Council is required to examine the situation in a Commission Report which may include proposals for change.

35. The Council itself recognized that the adaptation of rates should not only take account of the operation of the internal market, but also of the broader objectives of the Treaty. The actual rates applied to mineral oils in Member States vary considerably. Furthermore, the minimum

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(12) ERECO "Europe in 1998 - Chapter VIII, Energy issues"

(13) DIRECTIVE 92/81/EEC, OJ No. L316, 31 October 1992, P12

(14) DIRECTIVE 92/81/EEC, OJ No. L316, 31 October 1992, P19

(15) Directive 92/12/EEC, OJ No. L76, 23 March 1992, P1 as amended by Directive 92/108/EEC, OJ No. L390, 31 December 1992, P24

rates are often extremely low when compared with the rates applied in high-taxing Member States. There is a general consensus on the need for greater approximation, although so far there is little evidence of unilateral action by Member States in this area.

However, the level of existing excise taxes on mineral oils does not apply to all competing products.

36. The harmonisation of minimum rates, which the petroleum industry has requested, should respond equally to energy policy objectives which seek to maintain the position of each fuel in the marketplace. To do this it is necessary to take into consideration:

- equality of competition between the fuels, so that any increase in excise duties should not favour gas consumption. In fact, an increase of minimum taxes on heating oil would reinforce the market position of natural gas and increase the Community's energy dependency risks;

- equality of competition between electricity producers: The question is to evaluate whether the possible introduction of excise duties on gas would reinforce distortions in production costs, whereas the realisation of the internal market should favour competition;

- equality of competition between European industry and industry in other industrialised countries. According to both energy producing and energy consuming industries, the ultimate ceiling of fiscal imposition is the impact it has on competitiveness and long term investment.

Competitiveness of the industry sector

37. The search for competitiveness is not only important for energy consuming industries; it also is essential for energy producing industries because it determines their own capacity for investment as well as that of energy related sectors.

In the energy industries, investments in nuclear power and in exploration for oil and gas are considerable and returns are made over a long period. The oil and gas industry considers the needs for investment for the next fifteen years at 300-400 billion dollars. It is therefore fundamental for the Community's continued supply that these companies are able to operate in an understandable and predictable environment in both external and Community markets. Indeed, upstream and downstream investments are on a major scale - those in Europe constitute only a part of total world investment - and they have to be able to compete in the world market for available funds.

38. For its part the gas industry considers that a precondition of investment is the protection of the national markets because of the long-term constraints of the sector and in view of investment needs of between 100 to 200 billion dollars. Obviously, this attitude is not compatible with the single market, which assumes that an integrated European market will emerge; because the companies of this sector are international, there is no reason why they should not develop such a strategy.

39. The energy support and service industries have a market which spans the whole energy industry sector. This sector is most important in terms of jobs, the contribution to the trade balance of the Community and security of supply: for example the European off-shore oil support industry, mainly involved in the North Sea, employs 200,000 people with a turnover of more than 30 billion ECU. The nuclear power industry employs 300,000 to 400,000 people in the supply of equipment and services for the operation of this sector.

The competitiveness of these sectors, which are in fierce competition with industries of the developing countries, is essential for the competitiveness of the energy industry itself.

On the one hand, energy-related industry consumes energy itself and in this context is in similar circumstances to other industrial sectors. On the other hand, an essential factor for the competitiveness of these industries is the intensity and amount of RTD effort. To satisfy the supply of best technologies, these companies have to be in a position to finance their future development by investment.

The impact on production costs of the energy industry itself can be very significant: for example, technology made it possible to reduce costs and maintain the level of production in the North Sea in spite of the oil price reduction in the middle of the 1980's.

In the same way, industries providing the technologies used to produce renewable energy hold the key to increasing the contribution of renewables by improving their competitiveness compared to traditional energy.

2.2. Security of supply

An improvement in security of supply can be obtained by:

- *the creation of a climate favourable to the economic activity of companies;*
- *making a determined effort for energy saving;*
- *the intensification of efforts to develop domestic energy resources in both an economic and environmentally acceptable way, in particular renewable energy;*
- *continued diversification of sources and origins of our supplies;*
- *the strengthening of the flexibility of use of energy via network interconnection and extension towards peripheral regions and production areas;*
- *the strengthening of international cooperation between the European Community and its partners located in the supply areas;*
- *energy cooperation with the third countries, particularly the developing countries, in order to facilitate the transfer of energy-efficient technologies on a commercial basis;*
- *the strengthening of storage and other cooperative security measures intended to cope with an interruption of supplies;*
- *the provision of financial incentives for major investments.*
- *the use of energy less dependent on supply constraints*

What is "security of supply" ?

40. Security of supply can be regarded as ensuring that future essential energy needs are satisfied by means of a sharing of internal energy resources and strategic reserves under acceptable economic conditions and by making use of diversified and stable externally accessible sources.

This concept includes "physical" security, economic security and continuity of supply. All have a part to play in the quality of service provided to the users. However, a distinction has to be made between two aspects:

- short-term security, which covers the capacity to avoid supply interruptions to users due to cuts caused by exceptional circumstances; this primarily concerns oil and gas;

- long-term security, which is defined as the capacity for the energy industry to guarantee a reliable and economic supply of sufficient energy in the long term.

41. The introduction of wider freedom of movement for energy service products in the Community necessitates a Community approach to security of supply based on the instruments of the Treaty. Companies have an interest in that such an approach would bring them the market dimension they need for investment. Member States themselves should be interested from the point of view of the relationship between energy resources and national policies. In this respect, the integration of the Community energy market is in itself an instrument of security of supply.

Security of supply is linked with energy production and consumption in each Member State. Therefore, there is a national dimension to security of supply. However, measures taken by the Member States must be appropriate the objective. From the point of view of the internal energy market, there is also a Community dimension which is not simply the sum of the level of security in each Member State.

42. In fact, the definition of security of supply differs depending on the circumstances:

- correct functioning of the market should, by its flexibility, reach a balanced level where risk has been diversified, making it possible to ensure an economically acceptable supply of energy as much for energy using industries as for ordinary consumers, accounting particularly for the consumer policy provisions of the Treaty of the European Union (Article 129 A).

- However, instruments must be in place to ensure a swift response to shortages caused by a drastic reduction in volumes available, or to any other circumstance threatening supplies. These measures will become more important as overall energy dependence increases, as domestic reserves dwindle, and as supplies are increasingly sourced from politically unstable regions.

The level of the prices affects security of supply. Indeed, energy prices at too low a level can discourage operators from investing in new production or transport capacity, thus slowing down progress towards diversification of sources of supplies. Low prices can also cause users to relax energy saving efforts.

Security of supply in the field of coal.

43. The world market in coal is stable with abundant supplies from a wide variety of geographical sources. Most of the coal imported into the Community comes from the Community's partners in the International Energy Agency (IEA) or from States with which the Community and/or the Member States have signed trade agreements and are not considered to be high-risk suppliers. Security of supply and favourable prices can be achieved as long as companies are free to diversify their energy portfolio by the purchase of fuels on a global market.

Technological research and development efforts will contribute to increasing the possibilities for the use of coal in the European Community, irrespective of its origin, thus achieving a balanced energy-mix at the level of the Community.

Security of supply in the field of oil

44. Geopolitical factors figure prominently in global crude oil markets. As the European Community energy supply is dependent on imports, good political and trade relations between the Community and the oil and gas producing countries are of great importance:

- political risks are mitigated by long-term commercial agreements which often involve organisations in two or more countries with production, transportation and distribution investments that yield mutual interdependencies;

- an appropriate investment climate outside the EC is required to provide the stable conditions necessary for energy industry operations, particularly in the field of exploration and production, transportation and transit.

The producer-consumer dialogue and the European Energy Charter are important means by which this may be achieved.

45. Inside the Community, two factors will enhance security of supply:

- An appropriate climate for private investment in oil production capacity, refinery performance and flexibility, and transportation infrastructure. In these circumstances the recently adopted directive on the conditions for granting and using authorizations for the exploration and production of hydrocarbons should improve the level of activity. Also, the directive banning the use of oil for new power generation should be repealed.

- Technological research and development efforts undertaken by the oil industry and by the oil service industry could contribute to the exploration and production of additional resources in the EC well beyond current proven reserves, benefiting the EC's competitive position in exploration and production technology. For example, if improved technology were to lead to a one percent improvement in oil field recovery, this would equate to more than a year's global supply at current rates of production.

Security of supply in the field of natural gas

46. Looking at the expected supply and demand picture for natural gas in the coming 20 years, it is clear that security of supply under competitive conditions should be a key goal of an EC energy policy.

The industry position is that security of supply in the gas sector has never been put at risk by technical problems. Even where supply problems have arisen, existing arrangements have been adequate because of surplus capacity and supply diversification. The Gas Industry considers that in the development of any future energy policy, account should be taken of a number of specific aspects of today's gas market in the European Community which have ensured security of supplies:

- Long term supply contracts guaranteeing sufficient cash flow to the investment;

- Supply diversification with regard to volumes and origins of gas justify concentration of responsibilities for aggregation of supplies with a limited number of players;

- The setting of market prices by reference to the prices of substitute fuels;

- A stable economic environment encourages the continued planning of extensive interconnected gas networks and supporting storage, the physical means of providing security of supply. In the outlying regions of the Community, public subsidies for the setting up of networks can be justified on the basis that although possibly unprofitable in the short term, such projects will contribute to long term security of supply, as well as economic and social cohesion.

47. The Commission's position is that the increasingly interconnected European gas grid and the diversified nature of the gas infrastructure and sources of supply among Member States require that advantage should be taken of the Community dimension to enhance security of supply. Short term security of supply in the gas sector requires a careful and in-depth examination of the specific measures necessary to respond to gas supply crisis. The Commission believes that security of supply will be ensured through an open market functioning under competitive conditions at all stages from production to transportation, in accordance with the Treaty.

Security of supply in electricity

48. The supply of electricity requires diversity of primary fuels and considerable investment in power stations and networks in order to ensure continuity of supply and crisis measures. Renewables, hydro and nuclear power can only be used to produce electricity and together contribute to 50% of the Community's electricity production. Electricity generated from coal makes it possible to produce combined heat and power. All the options should therefore remain open and the policy of the Community should be complementary to that of the Member States, which have a wide diversity of fuels.

What will be the major factors of security of supply for the future?

49. Security of supply is primarily guaranteed by the individual members of the energy industry and particularly by the investments they make. It falls to public authorities to create a framework favourable for the development of this industry and where the financial and technical capabilities are a key element of any such energy policy.

In particular, the increased use of domestic resources would make it possible to reduce energy dependence which by consensus is otherwise expected to increase:

- Hydrocarbons; The limited availability of economically exploitable reserves presents the principal difficulty. Technological progress, tax incentives and concession arrangements will lower exploration and production costs.

- Coal and renewables; Current economic conditions are not favourable. Their uneconomic production can continue temporarily, paid for by public subsidies;

- Nuclear; New public opinion concerns have appeared due to the state of first-generation nuclear power stations in Central and Eastern Europe and in the former Soviet Union. These concerns hang ever more increasingly over the future production capacities within the Community despite the fact that from a purely energy point of view, nuclear power could ensure its independence.

50. Security of supply can be consolidated by:

- a regular dialogue between the Community and its principal suppliers of energy. This dialogue can be of a bilateral or multilateral nature. In addition to its bilateral contacts resulting from the cooperation agreements concluded with strategic regional groupings such as the Gulf Cooperation Council, the Community has to encourage a multilateral dialogue. This should be both within the framework of the International Energy Agency as well as within a broader framework of the 'producer-consumer' type set up by the ministerial conference following the Gulf War and in which the principal industrialised and developing countries involved in energy importing and exporting take part;

- the rehabilitation of the energy sector, both producing and consuming, in Central and Eastern Europe and the former Soviet Union. The implementation of the European Energy Charter will contribute, by means of cooperation, dialogue and common understanding, to the development of the energy sector in these countries, benefiting Community security of supply and technology transfer;

- the provision of assistance to developing countries in their efforts to contain enormous increases in their consumption. It is necessary to accelerate technology transfer and increase cooperation.

2.3. Environment

sustainable non inflationary growth respecting the environment is one of the Community's principle objectives;

synergies between the objectives of competitiveness, energy security and environmental protection need to be developed; in the case of conflicts between objectives, flanking measures need to be devised;

the internalization of external costs is central to energy and environmental policy. This policy is being developed progressively, as theoretical and practical problems are being addressed.

integration of the environment into energy policy is to be pursued through standards for products and processes, emission limits, fiscal incentives/charges, voluntary agreements, civil liability, etc. Cost effectiveness and co-responsibility are major criteria for determining the role of the various instruments;

markets for energy efficiency offering business opportunities need to be fostered;

a robust long term energy strategy, taking these issues into account, is required in case the current preoccupations concerning global warming are confirmed. The technology contribution will be decisive in defining that long term strategy as well as the promotion of a balance energy supply taking into consideration low environmental impact such as renewables;

developing a positive contribution to the Conference of the Parties on Climate Change in early 1995 and its follow up is important.

51. The Treaty on European Union has established sustainable non inflationary growth respecting the environment as one of the principle objectives. The 5th Environmental action programme has identified energy policy as a key factor in the achievement of sustainable development. This programme marks an important step towards the integration of environmental protection requirement into energy policy, introduced by the Single Act and made obligatory in the Treaty on European Union.

Moving towards sustainability requires a search for cost effective and balanced solutions for integrating the environment into energy policy. It requires the active involvement and participation of all economic and social actors. Voluntary schemes and vehicle regulation will have a more important role to play.

The policy challenge is to exploit synergies between energy and environmental objectives, such as improvements of energy efficiency, new energy sources with low environmental impact, strategic RTD and the demonstration of clean and efficient technology. The internal

market for electricity and gas will increase the efficiency of electricity and gas supplies, including the rationalization of generating capacities, serving the objectives for both competitiveness and the environment. The cost effectiveness of environmentally motivated action in the energy sector remains a crucial issue, in order to accommodate and balance the objectives of competitiveness, security and environment protection

Internalization of external costs

52. The internalisation of external costs has emerged as an important dimension of future policy. Traditional environmental action has focused on regulating emissions, e.g. the large combustion plant Directive. Alternative to this approach is the development of market instruments which seek to address the economic issue of internalisation of costs - an approach outlined by the Commission in its recent communication to the Council[16]

Briefly, the argument developed is that current market prices do not reflect the environmental damage caused by various processes. Hence producers and users generally have no economic incentive to reduce these external environmental costs which, as a consequence, are currently borne by others or by society as a whole. The internalisation of external costs aims at rectifying this situation by including the external environmental costs in market prices so as to make polluters pay for the costs they cause to others. This fully conforms with the polluter pays principle enshrined in the Treaty (Article 130R2).

The internalisation strategy allows the optimisation of global competitiveness of our societies by reducing environmental problems to the point where the next societal benefits (i.e. environmental benefits minus abatement costs) are maximised. As internalisation strategies imply that prices reflect the full cost to society, such strategies will lead to an improved allocation of resources. By using the market mechanism, internalisation draws on the ingenuity of all of society to minimise external costs in a least cost way.

53. Given the inherent benefits that such an approach entails in terms of sustaining economic growth, as outlined in the Commission communication on "Economic Growth and the Environment: Some Implications for Economic Policy Making", this shift towards making greater use of economic instruments should be one of the guiding principles of environmental and energy policy in the coming decade. The approach will permit partial substitution of a detailed layer of direct regulation that currently leads to a high degree of bureaucratic interference in the daily operations of industry and slows down the dynamism of the private sector in Europe. Provided that the revenues from internalisation charges are recycled to the economy in the form of cuts in other taxes - as the Commission has repeatedly advocated - this approach is clearly to be preferred to a general tightening of environmental standards. As the Commission has outlined in its White Paper on Growth, Competitiveness and Employment, this approach could lead to significant economic gains in addition to environmental benefits.

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(16) COM 94/465: Communication to the Council "Economic growth and the environment: some implications for economic policy making"

54. There are a number of important implementation issues to be addressed in devising such a policy, notably in relation to the role of accompanying policies, the gradual and predictable phasing in over time of the policy and domestic equity issues. Moreover, a careful strategy has to be designed to prevent undue loss of international competitiveness of vulnerable sectors.

The practical implementation of the policy has to be addressed so that the energy industry can go on to effectively internalise external costs. The processes of valuation, calculation and measurement of impacts have to be set out. This has been the subject of research efforts initiated by the Commission (the EXTERNE project) which will soon provide a first evaluation of the main fuel cycles.

In this context the biennial review of the mineral oil excise rates provides a useful mechanism through which measures to improve internalization of external costs could be advanced.

The role of markets for energy efficiency

55. Market frameworks have proved to be capable of bringing in innovative and efficient solutions for meeting basic energy needs. Harnessing market forces to exploit the substantial potential of energy efficiency is a priority. Markets should be developed in such a way that marketing energy efficiency offers business opportunities. The enhancement of energy market performance would reduce environmental impacts. Given similar economic structures in the Member States and competition policy issues involved, a Community framework is required.

Co-responsibility and voluntary schemes

56. The concept of shared responsibility involving all levels of society is an organizing principle of Community environment policy. Co-responsibility for the environment implies an important role for the economic actors. Coming closer to sustainability requires the active involvement and participation of all economic and social players and in which voluntary schemes and vehicle regulation might have a more important role to play in future.

The scope for increasing the role of standardization bodies needs to be investigated. The dissemination of cost-effective minimum standards is clearly beneficial in energy and environment terms. Regulation by standards or emission limits appears to be still needed in cases of adverse health impacts or when new problems (not recognized so far) emerge. In this event, industry often tends to take the stance that unless more evidence is produced there is no need for action. For recognized problems there may be scope for vehicle regulation.

57. By encouraging codes of conduct for environmentally friendly behaviour to be agreed within energy industries, the Commission services started action on voluntary schemes in the early 1990s. Such codes of conduct were agreed in the coal, electricity, gas and oil industries. These have been in force for some time, providing a source of experience that should be drawn upon.

Moreover, in the general context of limiting the environmental impact of their activities, industry is participating, in a voluntary capacity, in a Community system of environmental management and audit (EMAS) which will lead to an improvement in their production methods and to a more rational use of energy.

58. Voluntary agreements with manufacturers on labelling for energy efficiency and environmental performance is another example. Negotiations are under way for a voluntary labelling programme concerning energy efficiency of computer and other office equipment. This voluntary scheme would include manufacturers from the USA and Japan, which would provide for a near worldwide labelling scheme. It is desirable that such an approach, in particular in the form of voluntary agreements, is extended to industry, especially to the sectors with high energy consumption. Indeed, this voluntary and pro-active step provides an opportunity for industry to improve the energy efficiency of its production methods while allowing the necessary flexibility for safeguarding its competitiveness.

Long term CO_2 issues

59. The uncertainty about the exact nature of global warming and the consequences of climate change and the knowledge that the effects could be very significant imply that a balanced mix of policies is needed, focusing both on improved research into the issue and a least cost package of measures to slow down climate change. The period until the problem is either confirmed or recognized to be a non-issue can be used for precautionary action focusing on no regret measures (justified on other than CO_2 grounds) and voluntary schemes, bringing significant advantages in numerous fields (energy savings, reduction of atmospheric pollution, transport compatible with environment, competition and employment).

60. Fiscal instruments and incentives have a role to play and can be effective, as indeed can fuel substitution to low or zero carbon content fuels such as renewables and nuclear. Policy should focus on new products and processes and on facilitating market penetration. Technology is a decisive element in defining a viable long term strategy on CO_2. Substantial long term improvements will require major adjustments in policies affecting end user sectors. Transport is an important example. With actions affecting the fuel efficiency of engines, enlarging public transport alternatives, traffic management, urban planning and fiscal policies, the demand for energy can be limited without compromising mobility.

61. The external dimension of the CO_2 problem must be recognised. Future Community energy policy has to accommodate the global nature of the problem by being actively involved in the negotiation of a CO_2 protocol and in the joint implementation of the Framework Convention of Climate Change.

Energy related instruments for limiting CO_2 are generally long term in nature and influence developments beyond 2000. Even without further reduction targets the CO_2 policy challenge remains important. Stabilization of CO_2 emissions by 2000 implies that these emissions should not rise again after 2000. However, with economic growth expected to continue at a significant scale, substantial CO_2 abatement might be required.

A strategic long term approach, providing a framework for energy policy, is clearly indicated. The need to prepare a common position for the Conference of the Parties on Climate Change in Berlin early in 1995 indicates the urgency of such a framework.

The role of technology

62. In coming closer to sustainable energy use, technology has a key role to play. Energy/environment developments are contingent upon technology responses. Because of the time taken for cleaner and more efficient energy technology to penetrate the markets, available technology determines the economic and environmental performance of providing energy services. It is therefore important that there is a continuous process of bringing in cleaner and more efficient technology without the inherent delay of the normal market process. This requires action to be taken to minimise the delays for market penetration. The increased emphasis on dissemination of technologies in Community energy RTD programmes is relevant in this respect.

The position of industry

63. The oil and gas industry sees certain dangers in Community regulation based on Article 130T of the Treaty, enabling Member States to take more binding measures at the national level. They foresee a risk of harmonization based on the highest level of regulation, to prevent a divergence of measures on the basis of minimal harmonisation.

It underlines, moreover, that any new measure of environmental protection must take into account investments already made and the time necessary to carry out new investments. The overall approach should not make obsolete any actions which have just been set up to conform to a previous environmental measure. The objective has to be to establish equitable conditions through environmental quality standards and to set priorities in the drawing up of legislation.

64. The oil and gas industry recommends to the use of an Energy Impact Assessment (ENERGIA) which would ensure that all the implications of any proposed environmental legislation are taken into account in the decision making process. The methodology to be used throughout the legislative process should include: cost-benefit analysis to assess the need for, and the consequence of, action or lack of action; cost-effectiveness studies to assess the various means of addressing a proven need; prioritisation; risk analysis; peer-reviewed science; lead-time and pay-back sensitivities; and the defining of the conditions required for a level playing field.

65. The Commission considers that further discussion about the possibility of implementing the methodology proposed by industry is merited. In its communication on the Oil Market and Refining Industry in the Community, the Commission stated that because of the large investments involved, there was a need to apply cost-benefit analysis. It also identified the need to improve the predictability of the effects of proposed measures in order to facilitate appropriate investment planning and optimisation. The Council endorsed these recommendations.

III. PRIORITIES FOR COMMUNITY ACTION

66. Energy policy requires a continual balance between the sometimes contradictory objectives of competitiveness, security of supply and environmental protection. It is clear that the free operation of the market has to be the principal instrument of any policy. The intervention of public authorities has to be restricted to ensuring that this market functions to the satisfaction of the general interest. Consequently some major principles have to guide this process:

- the market is the primary instrument with which to attain the necessary balance under acceptable economic conditions, both for energy using industries and for consumers;

- regulation has to be limited strictly to the measures necessary for the maintenance of effective but equitable competition between the operators. It is intended to allow freedom of movement of goods, services and capital. At the same time regulation can prevent the liberalisation of the markets damaging energy efficiency investments.

- the instruments needed to manage interruptions of supply have to be applied in the context of the internal market.

67. The role of the Community is to place all its horizontal and/or sectoral instruments at the disposal of these objectives. This will ensure that the integration of the market can proceed while taking due account of the general interest. The Community dimension should also add value to actions and policies taken at the national level. But Community action to support national policies implies convergence of these policies and convergence between national policies and the policies of the Community. This is why it is important to establish clear and transparent common objectives which can serve as a framework of action for both public and private enterprises. The implementation of such measures to achieve the objectives requires that the contradictions are managed.

3.1 The importance of the internal energy market

68. Energy policy flows from the integration of the Community market. It is not for the Community to determine the choices of fuels. National authorities can do so at their level in the context of increasing internationalization and interdependence of the markets. The Treaty principles of non-discrimination have to be applied fully to ensure freedom of investments as well as free movement of energy services.

69. That the point of departure varies greatly from one State to the another should not be an argument against seeking to achieve the internal energy market. It will contribute to essential

factors of the economy. Reduced prices and greater efficiency in production, transport and distribution will result. Decentralisation of decisions, adaptation to the needs of the consumers, rationalisation of production, closer industrial cooperation and an incentive to innovation and flexibility are further contributions to improved productivity.

3.2 Taking account of the essentials

70. The integration of the market can be encouraged by regulation or liberalization of the market. It is in the Community's interest to limit Community regulation to the absolute minimum necessary to reconcile freedom of movement with the legitimate objectives of the Member States. In the field of energy, the essential and legitimate elements are:

- protection of public service missions;
- security of supply;
- environmental protection
- energy efficiency.

However, public authority intervention in each one of these fields has to be in proportion to the objectives as well as compatible with the dispositions of the Treaty. It is the task of the group Molitor[17] to make sure that the national and Community regulations in these fields are fully justified. Regulation could be avoided in areas where industry can adopt up measures which satisfy public concerns. There is therefore only a limited number of cases where public, and if necessary Community, intervention would be necessary.

3.3 Missions of general economic interest

71. In the field of energy, as in other fields, the protection of services of general economic interest, which is broadly translated as consumer protection, was often invoked to protect national markets from internal competition as much as from intra-Community competition. But, a priori, one can consider that the market is in a position to satisfy consumers' requirements, i.e. internal production capacity coupled with imports will meet their needs.

The question arises mainly in the gas and electricity sectors because of the natural monopolies created from their distribution networks. Proposals aiming to introduce a certain degree of competition on these networks are under discussion in the Council and Parliament. These proposals aim to make the operation of the networks compatible with the rules of the Treaty.

72. It is the Commission's responsibility to make sure that laws enacted by Member states are not contrary to the Treaty and that these rules are correctly applied in the interest of consumers.

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(17) The MOLITOR group is a group of independent experts created by the Commission at the request of the Council with the mandate to examine the Community and national legislation which blocks the economic development of the Community

The Commission has also to ensure security of supply at Community level. Current actions in the field of trans-european networks already fit into this context in that they aim at greater physical and technical integration of the networks and a better geographical distribution of gas and of electricity. However, the ideas that the proposed Directives have initiated must be pursued in three fields:

- *cooperation between the regulatory authorities.* The development of greater integration of gas and electricity network operation requires the strengthening, in certain Member States, of the distinction between the regulatory responsibilities and the economic and commercial responsibilities of the producers, carriers and distributors. The monitoring of the correct operation of the single market in compliance with Community rules could justify the organization at Community level of cooperation between the national regulatory authorities.

- *network management.* In view of the increasing interdependence of the networks, which will be accentuated by the adoption of new rules for the functioning of the internal market, the question is raised as to what point the future work of the UCPTE (Union for the Cooperation of the Production and the Transport of Electricity) will have to be developed to adapt to the operation of a more integrated market.

  The development of private production, particularly in markets which until now were subject to production monopolies, will strengthen electricity exchanges. Thus the producers of a Member State will be, according to their commercial strategy, increasingly market dependent. But the current organisation of these markets involves the utilisation of as many networks as there are separate administrations to cross, be they national territories or regions, each one having its own tariff policy and commercial strategy.

  One can observe that, in the gas sector, cooperation between network administrations exists because investments for the transport of gas are by definition cross-border in view of the gas dependence of the Community. These networks are built by consortia which determine common management methods. The development of interconnections between various production areas and the introduction of competition rules creates a novel situation. Now that the rules of competition have been introduced, is it possible to preserve sufficient cooperation for the proper functioning of a Pan-European gas network?

- *the need for harmonization.* The harmonization of legislation has to respect strict criteria established by the Treaty. It must ensure that the operation of the single market is not to the detriment of aims pursued by national legislations and justified by the Treaty. It has to respect the principle of proportionality.

  In the field of energy, the identification of the need for harmonization runs up against the fact that often the aims pursued by the regulatory bodies in Member States conflict with the objectives of the players in the sector.

  Future policy should therefore identify the precise requirements for harmonization which should ultimately complement the introduction of competition rules by making

the distinction between those which concern the Community and those which concern a limited number of Member States. In the latter case, the Commission will examine the possibilities offered by Article 101 to surmount obstacles affecting exchanges of electricity and gas between certain Member States taking into account existing transport capacities.

3.4. Security of supply

73. The analysis of energy forecasts justifies concern with regard to the increasing import dependence of the Community. This trend should lead to a set of guidelines for action, the conclusion of which would be to give the Community the possibility of addressing these needs.

Recourse to all fuels for electricity production has to be preserved. This supposes the adoption or strengthening of public action concerning:

(i) The exploitation of domestic resources by the Community via research and development efforts in the field hydrocarbon. This implies a redefinition of the priorities in the research programmes of the Community;

(ii) The maintenance of certain level of coal production under rational economic conditions and the pursuit of RTD efforts in clean coal technology;

(iii) The acceptance of the nuclear option in accordance with the commitments entered into under the Euratom Treaty. This will not be achieved without extensive explanation of the safety guarantees offered by technologies in development and by an upgrading of the nuclear power stations of the Eastern European countries. Without such an acceptance, the development of electricity trade and the freedom of investment will create tensions. The tendency will be to invest in Member States which accept nuclear power with the intention of importing the electricity from them;

(iv) The adjustment of indirect taxation in order to ensure equality of competition between substitutable fuels. This will obviously result from the elimination of distortions existing within national tax systems in relation to energy products and in particular by continued progress towards tax harmonisation between the Member States;

(v) The development of renewable energy by increased supportive actions in the area, for example, of standardization and RTD;

(vi) The coordination of national and Community financial contributions according to common energy objectives: diversification of fuels, environmental protection and transmission and distribution networks;

(vii) The removal of operational constraints on oil fired electricity production.

74. The energy sector is characterized by the existence of long-term contractual relations which are supposed to ensure the continuity of supplies and depreciation of investments. These long-term contracts are developed according to the demand forecasts of a market which is currently strongly protected; the transparency of these contractual relations is ensured with respect to the national public authorities to ensure that they meet the national needs.

The development of competition inside the Community will make it more difficult, as indeed the industry sectors concerned have highlighted, to manage the market. Co-operation with national authorities will not suffice to satisfy the requirements of security of supply at the Community level.

Is the transparency of procurement agreements necessary for security of supply and is it necessary, in each national market, to give to national public authorities the opportunity of evaluating the market consequences of contracts negotiated by a company or a group of companies on the operation of each national market?

It is in any case obvious that the actions of the companies on a national market will have effects on the European market and require therefore a maximum of transparency, respecting obviously commercial confidentiality.

75. As regards to crisis management, the oil companies challenged the obligatory storage mechanism of the Community because it would create unjustified financing costs which should, according to them, be carried by the users. It is true that companies of this sector bear the cost of these measures which are of a public nature; it falls therefore to the public authorities to reduce these costs as much as possible while enabling companies to manage stocks for the Community territory. The setting up of national storage bodies would make it possible on the one hand, to ensure the taking into account of the interest of each operator concerned (refiners and importers) and on the other hand, to reduce the storage costs.

76. The question is also raised of the challenge posed by the expansion of the gas market. Analyses reveal continual growth of this fuel in the Community market and, consequently increasing dependence in relation to a limited number of suppliers

The gas companies themselves have developed either at their own initiative or at the instigation of public authorities, a storage policy to cope with interruptions in supplies. Interruptible contracts were concluded with users who can easily switch between fuels.

Although the gas market does not have the same international dimension as oil, interruptions in gas supplies would have immediate effects on other fuels. This is why the gas situation of the Community would justify common monitoring, with the Member States and companies to allow the public authorities to prevent any difficulty. It would justify requiring that the transparency of measures to be taken by the Member States and companies to cope with a crisis.

3.5 International co-operation

77. The adoption of a political and economic cooperation strategy towards supplier countries into which would fit the administration of bilateral and multilateral agreements concluded by the Community and the financial instruments placed at the disposal of these agreements. Mechanisms for a structured dialogue need to be set up:

(i) The creation of a programme for energy cooperation with third country consumers and producers, modeled on demonstration projects financed by current budgetary means, to establish a permanent dialogue between the Community and these countries and exploiting the industrial interests concerned;

(ii) The European Energy Charter, beyond the disciplines that it sets up as regards trade and treatment of investments, has to allow a permanent dialogue between countries from the same geographical region and the development of specific cooperation projects;

(iii) The producer/consumer dialogue at ministerial level will lead to better mutual understanding;

(iv) Cooperation with the countries of the Black Sea is essential for the security of transit into the Community;

(v) Cooperation with the Mediterranean countries has still to be strengthened; the interdependence of these countries would justify a multilateral approach comparable with that of the European Energy Charter;

(vi) The development of the trans-european networks. In accordance with the Maastricht treaty, action in the field of networks has an international dimension. This dimension is already evident from the proposal for a common list of projects. The adoption of this list could form the foundation for a coherent Community approach, together with the European Energy Charter and the CSCE to make secure the investments necessary for realization and exploitation of these networks.

3.6. Environmental protection

78. In its pursuit of global competitiveness, the Community should make further progress with respect to reducing external environmental costs that diminish the overall well-being of the citizens of the Community. The Commission has repeatedly advocated that the integration of environmental policy making in sectoral policies and a greater use of market based policies instruments are the key to a sound internalisation strategy. Obviously these principles apply also to the energy sector.

Clearly, these policies have to be well devised by balancing the costs and benefits and taking account of these criteria in selecting policy instruments. In general, this will imply a

reorientation towards a greater use of economic instruments as such instruments allow least cost solutions to be reached. There is a variety of economic instruments each of which is characterised by specifics such as: taxes and charges; tradeable permits, deposit-refund systems, technical regulations on consumption products and under certain circumstances, voluntary agreements.

79. The development of these instruments and the priority to be given to each one of them will have to take into account in particular:

- industrial competitiveness; which implies that the measures taken do not affect the position of our industries on the Community and external markets;
- the capacity of the industry to set up voluntary agreements and the capacity of the Community to promote them;
- that the capacity for Community action and its recourse to instruments can only happen if there exists the capacity for effective decision by Council and Parliament.

3.7. Energy efficiency

80. The European public authorities have a duty to promote energy efficiency, not only because it contributes to environmental protection but more especially because it constitutes the only consensual response to the challenge of energy dependence. This intervention by public authorities is all the more necessary because present energy prices do not constitute an incentive in this direction.

Reinforcing the actions of public authorities in the area of energy efficiency is necessary because this corresponds to the needs of the European citizen who sees in this the means of fighting all forms of pollution by whatever method; resorting to new technology, intervention in the transport field and also changing end-user behaviour.

81. Intervention by the Community could take financial and regulatory forms:

- financial support for RTD in energy efficiency and energy saving in the field of energy efficiency;

- financial incentives must accompany cooperation with the developing countries or those in the process of development in the same way as regional energy programming. Member States have a central role in this respect and the Community can intervene only to add value to these national efforts: the European dimension will facilitate European industry, while cooperating on projects, to stimulate the industrial synergies necessary for the promotion of our technologies. The European dimension will encourage, by the exchanges of experiences between various regions or cities of the Community, the better management of resources given the diverse situations. The same exchange of experiences could be made in public campaigns to sensitise public opinion.

- regulation seems inevitable to influence the behaviour of individual consumers. This regulation, in that it affects free movement of goods, has to be done at the Community level, but has also to respect the principles of subsidiarity and of proportionality. It alone is in a position to correct the rising trend of increasing energy intensity and should also contribute to the distribution of new technologies to the market.

3.8 Technology

82. Research and technological development efforts contribute to the achievement of each of the identified objectives, as do promotion of innovative technologies on the market and their dissemination within the industry. When carried out at Community level, the actions benefit from synergies which focus the resources available and reinforce the possibilities for co-operation between the industries of the Member States.

In this manner, technologies for reducing energy consumption are developed. Enhanced exploitation of fossil fuels and better use of new and renewable energy sources are aimed for. Energy diversification will be improved and these technological developments will reinforce Community industries' capacities in the external markets.

83. A debate must therefore take place on the best modalities for implementing Community RTD resources which will be:

- coherent with the energy policy;
- likely to reinforce Member States' efforts;
- capable of improving the competitive base of European industries, in particular for Small and Medium-sized Enterprises (SMEs).

3.9 Role of the Community

84. The role of the Community in the field of energy, as in the industrial field, has to take into account the fact that the main actors are enterprises and that the market has in theory to fulfil the requirements of consumers and society as a whole.

In this general context, the Community must have its own instruments of energy policy, whether they are to strengthen the efficient functioning of the internal market, or to add value to the national policies. The action of the Community has obviously to contribute to the implementation of the international commitments of the Community and to other international organizations' action of which it is a member.

85. The question is therefore how it is possible to ensure a convergent approach around the common objectives when the responsibility for the implementation of these objectives is distributed between companies and between the national and Community public authorities. The problem is to enable the establishment of confidence between Member States by

transparency, dialogue and the exchange of information guaranteeing convergence in diversity. It is obvious that the energy situation will remain different from one State to another, just as it is in any industrial sector. But, in contrast to the other industrial sectors, it is in the public interest to ensure that the quality of energy supply is maintained. In an integrated and competitive market it is in the interest of all Member States to ensure that public intervention is not contrary to the collective interest of the European Community.

86. Convergence must start at the level of economic analysis. The imperative of an energy policy is the ability to accommodate market trends and to immediately adapt to any new developments. But these evolutions of the internal market of the Community will be increasingly dependent on global trends in consumption, in production and in transport conditions. These analyses are made by companies and international organizations. Without duplicating this work and by using their results, it seems necessary to have at a Community level means of analysis which would enlighten the decision-making process of the Community. It is obvious indeed that the application of the rules of operation of the internal market, the adjustment of priorities as regards research, of environment, of international cooperation, of networks, of economic and social cohesion, has to rest on a consensual analysis of the problems and of the market trends. Involvement of academic circles, industries, consumers and the administrations in a open and transparent way would guarantee a coherent analysis on which to base the development of an energy policy.

87. Convergence has also to be ensured by dialogue between the Community and national authorities in the respect of their perogatives. National energy policies must be regarded as matters of common interest just as national economic policies are. A common framework for the examination of national energy policies should be set up to make it possible for the Commission to submit a report regularly to the Council and to Parliament on the coherence of these policies with the common objectives. There is no question of a harmonization of policies which would not correspond to the reality of the market and their structures but rather to ensure that each public actor contributes to the carrying out of the common objectives.

88. The analysis that the Green Paper aims to launch will contribute to the implementation of the Treaty on European Union. Indeed, comparing the common objectives that the Community has set itself and the significance and efficiency of the instruments that the existing policies provide to the Community is an essential exercise for the definition of future Community energy policy guidelines.

ANNEX A - ENERGY CONTEXT

THE ENERGY CONTEXT

A.1 Energy consequences of the new geopolitical context

A.2 The different markets

- 2.1 Coal
- 2.2 Oil and Gas
- 2.3 Electricity
- 2.4 Nuclear sector
- 2.5 Renewable energy resources
- 2.6 Energy efficiency

A.3. New technology

- 3.1 Supply side
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A.4 Environmental protection

A.5 The regional dimension, economic and social cohesion

A.1 Energy consequences of the new geopolitical context

International energy cooperation has become a necessity because of:

- **increasing pollution due to the growth of consumption, notably in developing countries;**
- **the role of energy in contributing to the stability of countries, be they producer or consumer nations;**
- **the increasing energy dependence of the Community**
- **the growth of the world markets in production, transport, distribution and consumption technologies.**

89. World politics and economics have experienced major upheavals in recent years which have significantly influenced the energy situation:

- *At the political level*: the breaking up of the Soviet Community, the development of democracies in Central and Eastern Europe, and also in several Latin American, African and Asian countries; and not least, the peace process in the Middle East;
- *From the economic point of view*: the continuing globalisation of the economy with the signing of the GATT agreements and several regional free trade agreements (North American Free Trade Agreement, between Mexico, Canada and the United States) or of economic integration (MERCOSUR between Argentina, Brazil, Paraguay and Uruguay); and the emergence of new partners in world trade.

90. Paradoxically, in the energy sector, these changes do not necessarily result in greater security of supply for the Community. Certainly, from an industrial point of view, they give new opportunities for investment in the countries concerned, and from an energy point of view they give greater trading and political stability. However, they also create new concentrations of energy consumption which could lead to a tightening of the market, which in certain circumstances could have pricing consequences. These new situations create therefore new requirements for energy cooperation.

91. The strong demographic growth and the economic development that the Mediterranean Third Countries will experience by 2020 will result in considerable increases in energy consumption (almost tripling) and of electricity (by a factor of five).

- *On the supply side,* the continuation of increasing gas exports and the maintenance of oil exports, while guaranteeing the supplies of the internal market, will require a considerable rise in energy production. A major exploration/production effort will therefore be necessary.

- *With regard to electricity,* the expected growth in demand will create investment requirements in of production, transport and distribution which would appear to necessitate some involvement of the European industry.

- With regard to oil transport, the Black sea is strategically important in relation to oil supplies for the Community; political and environmental developments in the region will not be without implications for future supply options.

92. The countries of the Arabian Gulf (i.e. the countries of the Gulf Cooperation Council and Iran and Iraq) represent today 35% of Europe's oil supply. It is probable that their share in the energy supply of Europe will increase further in the future. It would appear that very large investments will be required for the future development of both the oil and, particularly, the natural gas sectors. The development of economic and commercial relations with these countries and notably the development of free trade with the countries of the Gulf should contribute to the protection of investments in these countries and supplies to the Community.

93. The Central and Eastern European countries and the Commonwealth of Independent States have serious problems regarding energy efficiency, security of investments and environmental safeguards. But, the energy situation differs depending on whether they are energy-importing or energy-producing countries.

- *For the importing European countries,* the collapse of COMECON and the Soviet Community resulted in an increase in the cost of their supplies. At the same time, the contraction of economic activity reduced their energy demand, but less so in view of their very low level of energy efficiency. Progressive economic recovery should result in an increase in demand by the end of the century although, at the same time, the possibilities for increasing production are limited. These countries use mainly coal and nuclear power, both of which pose environmental problems, but the financial resources necessary for restructuring are lacking. In the long term, diversification of energy types or sources could be achieved, for example, by interconnection of their networks with Europe.

- *In producing countries,* notably Russia, the economic and political transformations have strongly affected investments, production and trade of energy. Energy production could decrease further in 1995 before rising again in 1996, sharply in the case of oil, more slowly in gas, while that of coal should, at best, stagnate. Under these conditions, net exports could increase strongly for the period 1995-2000 and more slowly thereafter, in particular under the influence of the economic recovery of the Central European countries.

- *Nuclear energy production* should remain almost constant until the reliability and safety of the current facilities are ensured. However, there is no guarantee that faced with energy supply difficulties, some of these countries will not re-adopt programmes of this type. In this context, the European Community should increase its efforts at cooperation with these countries regarding:

  - the re-establishment of hydrocarbon production capacity in the republics of the CIS;

- increasing energy efficiency;
- safeguarding the environment in general and nuclear safety in particular;
- improving the energy balances of these countries by energy programming and aid actions for the development of new environmentally friendly energy resources.

. *From the point of view of the operation of electricity supply networks,* these countries will be in a new situation with the separation of the UPS (United Power System of the former Soviet Union) from the Central and Eastern European countries and the connection of those countries with the network of Western Europe. It will have to be ensured that during the transitional period they will not be penalized, and that a variety of options for stabilization of the networks and of energy exchanges through stations with d.c. current will be maintained.

94. Demographic increases and economic growth in Asia and Latin America will result in sharp increases in energy demand.

. According to certain estimates, demand could grow by 30% between now and 2020 in Asia and double in Latin America. This situation could have serious environmental implications: India and China alone could represent a quarter of the emissions of CO_2 in 2010. Asian energy imports could increase from the Arabian Gulf in the form of LNG, for example, or from the oil producing republics of central Asia; Asia could increasingly compete with the European Community for supply from these producing areas which currently export 21% of their production to the Community. The increasing electricity sector will create a demand for nuclear power as is already the case in China.

. For Europe, these countries will be competitors for energy supplies but they will also be an important potential export market for economic and effective energy use and production technologies; for clean energy technology as well as for investment advice in the energy sector. The financial needs of the energy sector for the next twenty years will be immense in these countries - some of which are already heavily in debt. Under these conditions the main energy policy principles should be, in Asia and in Latin America, to improve significantly the overall effectiveness of the energy sector, to develop the supply capability and to define an appropriate investment framework to attract private capital.

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A.2 The different markets

Coal will retain a leading place in the energy balance of the Community due to the increasing penetration of imported coal.

Oil consumption will be determined by the transport sector; as long as fundamental changes do not occur in this sector, efforts to reduce dependency on oil will be in vain.

The consumption of electricity will continue to grow but at a lower rate than the transport sector. Gas will claim an increasing share of electricity production, especially as the future of nuclear power remains dubious.

Renewable energy's contribution will increase as a function of specific conditions connected with the type of energy and with increased decentralisation of production installations.

The future development and use of different fuels development will be influenced principally by the aims of environmental protection and by the need to diversify to limit import dependence.

2.1 Coal

95. Coal has been identified as the most abundant non-renewable energy source available. The resources are geographically diversified and at current production rates, would last for more than 200 years. International sea-borne trade has opened the way to a highly competitive international coal market. The market is characterised by its flexibility and transparency.

Coal[18] has played, and will continue to play, a very important role in the European Community energy sector, particularly in the generation of electricity. It accounts for nearly 20% of total (gross) energy consumption in the EU, of this about 68% is produced indigenously.

Electricity generated from coal represents 36% of total production in the EC market. Coal continues to be an essential requirement for the steel industry although the consumption trend depends, to a large extent, on future developments in the sector.

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(18) In this document the term "Coal" is used to refer to Solid Fuels, i.e. Hard Coal, Lignite and Peat.

Solid fuel balance for 1994 (in millions of metric tonnes)				
Coal Production	Coal Imports	Consumption (as % of internal deliveries)		
		Thermal power plants	Coking plants	Others
134301	116868	63%	20%	17%
Production and imports of lignite and peat: 293.184				

Lignite is produced economically and consumed in power plants close to the source of production. Production costs of domestic hard coal are substantially higher than prices for imported coal. Production of indigenous coal is steadily decreasing in the EC. These reductions in production are being offset by imports from third countries.

96. Coal markets are highly efficient and enjoy a high degree of accessibility throughout the world. The coal market can enhance the economy's competitiveness within the European Community by facilitating the establishment of favourable energy prices and, in addition, intensify competition between suppliers of primary energy. It is generally agreed that coal has been instrumental in the reduction of energy prices and continues to play a role as a regulator in the energy market.

The coal market's future is nevertheless dependant upon the resolution of environmental challenges. The reduction of its environmental impact through new techniques for clean and more efficient combustion is the key to maintaining and even increasing the share of coal in the Community's future energy balance;

2.2. Oil and gas

97. Oil and gas must be addressed in the context of a global energy market which is functioning with open international competition for investment as well as supplies. Over the past 20 years the EC oil and gas balances have become increasingly diversified in terms of geographic sources. This has been largely the result of economic factors. Diversification of crude oil and gas supplies through the market mechanism have proved to be fundamental to the achievement of acceptable levels of supply security. Over the last ten years, consumers have enjoyed abundant oil and gas supplies at low prices.

Oil and gas will provide more than 80 percent of the expected increase in world and EU energy demand over the next 15 years.

Community Oil and gas Balance : 764 Mtoe (63 % of the Community total balance) 1992			
Oil Consumption	Percentage of oil imported	Gas Consumption	Percentage of gas imported
535 Mtoe	78%	229 Mtoe	36%

A competitive and thriving oil and gas sector promotes the growth of world-class related industries in the Community. Although this sector is not particularly labour-intensive, it nevertheless stimulates an important number of jobs in energy-related industries, such as high-technology equipment suppliers.

Oil

98. Oil will remain important in the near future with an on-going increasing demand drawn by the transport sector before it may have to stabilize due to worsening problems of traffic congestion and environmental pollution. For the longer term, possible changes induced by progress, notably in engine technologies, might be a source of change in the pattern of consumption and thus a reduced share for oil in the total Community's balance.

Supply diversification should continue to be fostered as cost-effectively as possible. Middle East reserves, especially Gulf reserves, will play an increasingly important role in providing crude oil to EC refineries in the future. In this context, the hopes for development of crude oil reserves in Russia, other former Soviet Union countries, Latin America and other parts of the world, is a balancing mechanism to an excessive reliance on other regional supplies of crude oil.

Gas

99. The importance of gas in the European Community energy balance is growing due to technological development in electricity production (gas combined cycle) and a lesser impact on the environment. The share of natural gas in the EC is expected to rise from today's 19% to as much as 24% of total primary energy consumption by 2010. This implies that demand will rise up to 50% from today's levels.

This increasing demand will lead to a modification of the structure of gas consumption, notably its growing share in power generation and in cogeneration. Also countries and regions of the EC, where the use of gas was non-existent or reduced, are in the process of introducing or increasing the natural gas share in their energy balance.

100. While reserves of gas are plentiful and enough to cope with this demand increase, these reserves mostly lie in more distant and difficult parts of the world:

- The share of imports, currently at nearly 40%, is projected to grow towards 70% by 2010. Apart from Norway, new imports will have to come from the former Soviet Community, Algeria and over the long term from other African countries and from the Middle East.

- Since the large scale international gas sales started in the sixties, the gas grid in the European Community has developed quickly. Today there is a technically reliable, extensive European grid which connects suppliers with the consumers in the European Community. On the basis of commercial agreements in 1993 over 50% of the gas consumed in the European Community crossed one border and about 30% crossed more than one border.

- Making gas available to the consumer, however, is not only a question of reserves and physical access to them, but it also concerns the economic, technical and political conditions which make the sale of gas secure, reliable and economically attractive to the consumer as well as to the supplier and the producer.

In view of the scale of capital which will be required, further development of the gas fields as well as of the international gas grid and of the interconnections between gas grids and other gas facilities throughout the European Community require that the business environment remains favourable for commercially based investments.

2.3. Electricity

Electricity production in the European Community: 1858 Twh production capacity 455 GW - 1993					
nuclear	Coal	Hydro	Oil	Gas Natural	Others
36.4 %	34.1 %	9.9 %	9.8 %	8.7 %	1.1 %

Electricity production in the European Community and the 3 new Member States : 2128 Twh Production capacity: 520 GW - 1993					
Coal	Nuclear	Hydro	Oil	Natural gas	Others
33.1 %	33.9 %	14.2 %	8.9%	8.3 %	1.6 %

101. Production of hydro-electricity will increase by 60% with the entry of the new Member States. As a result of several underwater cable projects in the North Sea and in the Baltic as well as the reinforcing of North-South transmission lines axes, the use of hydro-electricity will increase.

The electricity companies (production, transport, distribution) employed 740,000 persons in the European Community in 1993. Their annual turnover is about 140 Billion ECU, and annual investments account for 30 Billion ECU.

Electricity consumption in the Community should grow at an annual average of 2% from 1995 to 2000, to reach a total of 2150 GWh in 2000. 85 GW (including gas 60 GW) of new capacity is planned between now and the year 2000, which corresponds to a 2.2% average annual capacity increase.

Choice of fuels

102. Increasingly constrained by environmental pressure, particularly in relation to CO_2 reduction strategy, the following factors should be taken account of in fuel mix decisions:

- *coal,* which the electric sector wishes to preserve as an open option, cannot achieve preeminence without development of clean and more efficient combustion technologies and the penetration of the market by these technologies in an economic manner.

- the most effective least cost power stations will be built, namely power stations with *combined cycle gas.* The installed gas-fired capacity will have more than tripled between 1993 and 2000. That will increase consumption of gas with the consequent risk of upward pressure on prices.

- A new debate on the place of *nuclear energy* within the European Community is inevitable. It represents 34% of electricity production and the major part of the nuclear parc will have to be replaced by about 2005-2010 with a construction period of about 10 years. This debate will have to take account of the economics of installing nuclear capacity; the trend in non-nuclear electricity production towards building smaller units closer to the consumers in appropriate specific circumstances; new nuclear production technologies offering improved safety; fuel market considerations - noting the insensitivity of nuclear power to the variations of the cost of its fuel; and finally responses to the question of the treatment and storage of nuclear waste.

- the use of *renewable energy* for electricity production in the Community ought to be encouraged in the light of the environmental benefits, particularly in relation to global warming. The most promising routes for electricity production in the short to medium term are gasification of biomass, wind energy (which is already largely competitive), the utilisation of waste heat and hydro, notably small hydro schemes. The contribution of other renewable energies to electricity production is modest; the development of some of these energy forms pre-supposes research and development efforts the impact of which will only be apparent in the long run.

The improvement of energy efficiency, which includes integrated resource management, will contribute to a reduction of electric consumption and, consequently, to a reduction of CO_2 emissions.

Development of networks

103. In the absence of storage facilities, the electricity supply networks have to maintain stability and balance between supply and demand. It is obvious that such networks require strict planning, optimum management and rigorous maintenance of the system; absolute respect for quality standards for supply of electricity, in particular those for tension and frequency, is essential.

The interconnection of the various networks is one of the most suitable ways to improve their safety and stability. This led to the foundation of the UCPTE network in 1951 and to its progressive growth since then. In recent years, the use of the network for trade and transfers of electricity has increased. The technical advantages of the major synchronized networks can be summarized as follows:

- a reduction in reserve capacity,
- rapid mutual assistance,
- the better use of resources, such as for example hydroelectricity and thermal generation,
- the possibility of substituting less preferred methods of production.

2.4 The nuclear sector

104. The European Community is at the forefront of the world producers of nuclear power. A total of 132 reactors are in operation on its territory, distributed in six of the Member States, with an installed capacity of 107 GW. The contribution of this energy resource to the energy balance of the Community is important; it met approximately 14% of total energy demand in 1992. In all 678 Twh were produced, i.e. 34% of total electricity production, which is equivalent to total production in the United States and three times that of Japan.

Share of nuclear power						
France	Belgium	Germany	United Kingdom	Spain	Netherlands	Average
73%	60%	30%	26%	36%	5%	35%

The weight of this industrial sector is significant because it represents approximately 400, 000 jobs in the Community. Nevertheless, it must be noted that since the beginning of the last decade, investments in the field of nuclear power have been frozen in the majority of the Member States. Significant development programmes are ongoing in other parts of the world

(China, South Korea, Japan) in preparation for increases in future demand. In Japan, installed capacity will double by 2010 and nuclear power will deliver 43% of electricity production.

105. The nuclear sector is now in a decisive phase of its development because its future in Europe depends on the decisions to be taken in the next five years to ensure at least the renewal of current capacities:

- *the market for nuclear construction* is increasingly outside of the Community and the future of the European industry will depend on its capacity to hold a significant part of these external markets. For that, cooperation between the companies remains essential; it has already taken place in the field of future reactor development and in the establishment of common specifications;

- *international competition* can destabilize these investments because of the arrival on the market of both natural and enriched Uranium from the countries of the Commonwealth of Independent States and because of competition from the United States industry in all other aspects of the nuclear cycle. This situation threatens the technological lead of the European industry, for example in the use of the MOX fuel and reprocessing techniques;

- *nuclear non-proliferation* forms an integral part of the concerns of this sector; particularly regarding the conference of the parties to the Treaty of Non-Proliferation of Nuclear Weapons which will take place in 1995. An unconditional and unlimited extension of this TNP is necessary, more especially as disarmament will release considerable quantities of sensitive nuclear material;

- *nuclear safety* is fundamental: besides setting common specifications (European Utility Requirement) and the development of universal safety criteria within the framework of the International Atomic Energy Agency, European industry is concerned directly with the situation of the nuclear sector in Eastern Europe;

- finally, *the question of waste* remains a matter of public concern. Reprocessing or storage technologies are used for short life, low level radioactive waste which accounts for 90% of the total quantity of waste. High level waste is the subject of work to improve the envisaged industrial solutions, but these solutions can only be applied in the medium term. The resulting uncertainty justifies the pursuit of transparency and provision of information on waste management.

106. Overall, nuclear energy which offers benefits in the fight against emissions in general, and CO_2 in particular, occupies an important place in satisfying the energy needs of the Community. The decision to resort to nuclear energy is primarily political. However, investments have to take into account such aspects as economic and environmental costs, the existence of other energy resources, centralization-decentralization considerations and the long-term commissioning costs.

2.5 Renewable energy resources

107. The contribution of renewable energy sources to the final energy consumption of the European Community amounted to some 4% in 1991. There are significant differences among the Member States with about 1% in the UK and some 17% in Portugal. Two renewable energy sources are of particular importance in the European Community: firstly, biomass in form of wood, wood waste and other solid waste accounting for some 60% of the renewable energy production; and secondly, hydro power the contribution of which amounts to about 35% of the renewable energy production.

The contribution of renewable energy sources to the EC energy balance must be judged in the light of the objectives that the Community has set for the year 2005[19] in the ALTENER decision. The intention is to increase the share of renewable energies from the present 4% to 8% of the final demand. Efforts to implement this should be consistent with various community policies, notably the implementation of the Common Agriculture Policy reforms such as the freeing up of land and allowing those interested the option of producing either traditional produce (cereals, oil seeds, pulses and beets) or others (biomass, coppicing) which contribute towards ALTENER objectives.

Electricity generation on the basis of renewable energy sources.

108. Electricity generated from renewable energy sources is largely dominated by the contribution of Large Hydro.

Electrical uses: 180 Twh -1991				
Large Hydro	Mini Hydro	Geothermal	Biomass	Wind & solar
86%	8.3%	1.6%	3.5%	0.6%

The geographic breakdown shows some particularities: wind turbines are found particularly in Denmark, Germany and the Netherlands; geothermal is confined mainly to Italy.

The Community objective for the year 2005, as defined in the ALTENER decision, is for a tripling of the production of electricity from renewable energy sources, excluding large hydro-electric power stations.

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(19) Council Decision on the ALTENER programme 93/500 (CEE) of 13 September 1993 (cf OJ L235 of 18 September 1993)

Thermal use of renewable energy sources.

109. The thermal use of renewable energy sources is totally dominated by biomass/waste, as the following table shows:

Thermal uses: 23.3 Mtoe-1991		
Biomass Energy	Geothermal Energy	Solar Energy
97.5%	2%	0.5%

In the field of biomass, firewood for domestic heating is especially important in France and Germany but of less importance in Italy and Spain

Bio-fuels

These are mainly vegetable oils and their derivatives, such as bio-ethanol, which can be used as a motor fuel. New production technologies, starting with cellulose and used oils, open up interesting possibilities. The objective set by ALTENER is to ensure that by 2005 biofuels will account for 5% of the motor fuel market.

110. Meeting the apparent challenges of the costs - the costs of renewable technologies make them less competitive than conventional fuels - is a major preoccupation of future policy. A low price of non-renewable primary resources makes this problem even more difficult. Mass production of renewables technologies, such as wind turbines and solar panels, is likely to bring costs down. Likewise, intensified research, development and demonstration of renewable energy technologies is likely to make them more competitive. Notably, some renewables energy sources benefit from directly applicable technologies that are ready for market penetration. This is the case of biofuels for which growth requires a reduction in production and distribution costs which might be obtained by economic and tax instruments. As these biofuels present advantages for the Community's policies concerning agriculture, energy and the environment, the Commission has proposed that a reduced excise tax be charged on these products[20].

A key issue is whether the energy pricing policy includes externalities or not. The inclusion of externalities will certainly make renewable energy sources much more competitive. Other important barriers to market penetration of renewable energy sources are of a non-technology character and should be dealt with in terms of legislation, standards, dissemination of information, etc.

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(20) COM (92) 36 final of 22 February 1992, OJ N° C73, 24 March 1992

2.6 Energy efficiency

111. The market for energy services, which aim to reduce energy consumption and deal with associated environmental problems, has developed since 1974 in consumer countries. The interest in energy saving for the reduction of consumption and environmental protection is obvious.

Moreover, energy saving has considerable potential in some areas such as the building sector, which is very labour intensive, or in the modification or renewal of existing equipment. It is during the normal industrial investment process that energy saving is taken into account most effectively. Consequently the impact of energy saving policies is generally dependent on the existence of a favourable investment climate.

It is estimated that potential savings of the order of 10% to 30% of primary energy consumption could be profitably realised. These improvements in energy efficiency would save billions of ECUs in the different economic sectors thanks to a reduced cost of energy supplies. Nevertheless, strong initiatives will be required to dismantle the existing obstacles in the market.

112. Energy efficient technologies are an additional factor of industrial development. A notable example is cogeneration in the clay and ceramic industries and the chemicals sector which in each case offers important markets for the export of technology[21]. Studies of several industrial sectors showed that economies of about 20% of electric motor consumption were possible, with a payback of less than two years, by installing more powerful engines with more effective control systems.

113. The market for energy saving is influenced by the behaviour of private consumers. The Commission regularly checks public opinion and the last Eurobarometer[22] shows that European citizens are particularly sensitive to:

- the reduction of pollution risks; consumers are aware of environmental problems - for example, the greenhouse effect - which they blame mostly on the increase in the number of private cars. Their top priority is the improvement of air quality in cities;

- the reduction of energy consumption; 82% of European consumers consider this an important objective.

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(21) "Energy efficient technologies for European industries" and "Energy investment opportunities in European industry" - THERMIE programme

(22) European opinion and energy questions in 1993 - Eurobarometer 39.1 by INRA (Europe) European Coordination office s.a. - September 1993

The European citizen has a more positive image of natural gas and renewable energy than of other kinds of energy. They favour recourse to energy technologies. On the other hand they have little confidence in the ability of public authorities to promote energy saving.

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A.3 New technology

New technology plays a fundamental role in security of supply, energy efficiency and environmental protection.

An important factor in positioning industry in the external market both for the energy production industries and energy consuming industries. But new technology requires adequate instruments to facilitate its penetration into the market.

Energy technology also stimulates the development of related technologies in fields connected with energy (environmental protection, information and control technologies).

114. The future role technology will play in the energy sector in the EC will not only depend on the level of advancement of the technologies themselves, but also on their capacity to penetrate the markets and on the extent to which wide replication will be achieved. Advances in technology will be clearly led by the need to improve efficiencies while reducing costs, and responding to the challenge of reducing the environmental impact of energy utilisation. The extent to which energy will be used more efficiently through automation and control, as well as the existence of cheaper and more efficient emission monitoring and control systems, will play a role in responding to the demand for increased use of energy that will result from future life-style and comfort requirements. Consequently the role of technology should be considered from both the supply side, where the goal of the industries in these sectors is to provide energy in a cost effective manner, as well as from the demand side where energy is considered to be a service by the user.

3.1 Supply side

Coal

115. New technologies for coal combustion, as an answer to environmental challenges, have a very important role to play; indeed, developing countries as well as Central and Eastern Europe will, in general, rely on coal to satisfy a major part of their rapidly increasing need for electricity.

These technology advances will be directed essentially at electricity production and will be in two areas:

- In relation to *the conventional cycle*, pulverised coal technologies can permit the achievement of up to 45% efficiency, depending on the introduction of new materials and the application of higher steam turbine conditions. This is based on the assumption that emission levels remain at the same level. Fluidised bed combustion systems offer an alternative to pulverised coal technologies with the added advantage that lower grade fuels are used and pollutants are removed more efficiently.

- The area of *combined cycles* offers the most promising technology development with pressurised fluidised bed combustion systems at 45% efficiency even with poorer grade fuels. However integrated gasification in combined cycle offers efficiencies of 50% and over with virtually no pollutants other than CO_2.

116. It should be emphasised that new and improved technologies will not only be available for new types of plant but also for use in improving existing plants. The importance of retro-fitting and improving existing plants is increasing and can be an attractive option financially. There is a trend nowadays to increase the life of existing plants while introducing new technologies for both efficiency improvement and emissions reduction. At present the average efficiency of power plants in the European Community is below 35%. Improving all existing plant to 45% would cut CO_2 emissions by over 25% and, by a similar amount, the contribution of the cost of the fuel to the cost of electricity. The reduction of pollutants such as sulphur and nitrogen oxides is a requirement of the new technologies. Additionally, technologies which can generate electricity from low grade or environmental wastes from industry or municipalities will be developed, many of which will use coal in conjunction with this wastes. The challenge is not only to implement these clean technologies but to ensure their public acceptance. . This together with the need to export these technologies to other parts of the world call for an action on a Community-wide level.

Hydrocarbons

117. The last decade has seen major improvements in technologies applied to oil and gas exploration. Several areas should benefit from further technological development:

- in exploration; the reduction of uncertainty in reservoir location; increased well drilling success rates; improved reservoir characterisation and better production appraisal to improve recovery.

- in drilling; the development of deep drilling systems; cost reduction and less impact on environment.

- in production; the development of systems with reduced maintenance and enhanced operational capabilities (application of new materials for weight reduction, safety, maintenance improvement and reduced impact on the environment). Decommissioning of offshore platforms should progress further.

- in transport; oil and gas pipeline and tanker construction; multiphase transport. notably for marginal fields, as well as maintenance and repair technologies.

- in natural gas production; transport, i.e. improvement of the energy balance of the LNG chain and conversion.

Apart from the industrial challenge for the oil related sector, improvement in exploration and exploitation technologies is a key element to extend current Community resources, particularly in the North sea, and to continue geographical diversification of the sources of supply. Such technologies for improved exploration, production and transport must surely contribute to the recovery of the oil sector in Russia as well as the other producing countries of East Europe and Central Asia.

Nuclear energy

118. The major technological changes in this sector are connected with the development of a new generation of reactors which have export potential, particularly to the developing markets. In this context, the availability of powerful technologies is required in two areas:

- The strengthening of safety levels. The "European Pressurized Reactor" (EPR) project is an example of the ongoing development effort to produce a reactor that meets the latest safety requirements.

- The reduction of the environmental impact by optimizing the end of the nuclear fuel cycle. These technologies will result in utilising the best strategies for waste management.

119. Later on, other fields should benefit from progress resulting from the RTD efforts:

- Fast reactors, with their potential for recovery of uranium would also have the advantage of consuming plutonium and the incineration of long life actinides. A cooperation programme, called CAPRA (Consommation Accrue de Plutonium dans les Rapides), a collaboration between France, Germany, the United Kingdom, Switzerland and Japan, aims to progress this technology.

- Fusion is potentially an important long-term source of electricity supply for the Community. Nevertheless, its practical realisation requires an extended RTD effort the breadth of which has led to the integration, in one single Euratom programme, of all the research carried on in Europe, it has also led to the establishment of a cooperation agreement, signed in July 1992, between Euratom, Japan, the USSR, (now the Russian Federation) and the United States, based on the ITER project (International Thermo-nuclear Experimental Reactor).

Renewable energy resources

120. Some renewable energy technologies are commercially mature and can be cost competitive with conventional energy. An example is hydroelectric power which is well proven. Geothermal and landfill gas have also achieved small but significant penetration into specific

commercial markets. Wind energy and solar thermal heating are, or tend to be, competitive at specific sites with favourable conditions.

Other technologies are technically mature, but not cost competitive at present. This group includes solar photovoltaic, liquid biofuels, and small hydro at sites where there is not a sufficient energy resource.

The field of electricity and heat production from energy crops has a promising future. Development is needed, but these technologies are likely to be cost competitive notably through gasification and new methods for production of liquid biofuels. Finally, wave energy has limited prospects in terms of competitiveness with conventional fuels.

3.2 Demand side

Industry

121. Industry is characterised by a number of diverse sectors and production methods where energy technologies are often very specialised and have little potential for replication outside of the specific sector. The industry sector covers technologies both for the supply and distribution of energy (for example gas turbines and electricity transformers), and for the many and various technologies on the demand side (for example motors and drives, process heating and cooling). Since the first major energy crisis, industry has continuously improved the energy performance of manufacturing processes. As an example one can consider the chemical industry where, between 1980 and 1991, the specific energy requirement (i.e. the energy required per unit of output) fell by 27%. This is a result partly of the restructuring that the industry has experienced but also of the adoption of new and innovative processes and from improved control and management of energy.

122. In future there will be a change in emphasis:

- Firstly, there is the need to improve the industrial competitiveness of the Community in the face of a growing challenge from industries outside of the Community. Here technological development will concentrate on reducing production costs, where energy is a significant proportion of the production cost, and on producing higher quality products at an equal or lower specific energy consumption.

- Secondly, technology improvements will aim to reduce the environmental impact of production processes. This will be through increased recycling, innovative processes, or energy conservation measures which may vary from conventional energy savings to the more integrated use of energy supplies.

Within the energy industry itself, gas turbine development will continue. Heat recovery from exhaust gases is a second major axis of development. Other areas where improvements are foreseen include technologies for the transmission, distribution and storage of electricity. The more widespread use of cogeneration will depend on the expansion of natural gas networks

Buildings

123. Energy consumption in the building sector accounts for almost 40% of EC final energy demand and 20% of CO_2 emissions: most of the energy used in this sector is for space heating (70% of the total energy consumption for domestic buildings, and 55% for commercial and office buildings), followed by electrical appliances and hot water preparation. The introduction of common standard practices of energy conscious design and Best Available Technologies (BAT) in buildings should permit energy savings of about 50% in space heating and 25% in electricity consumption. The implementation of such practices and equipment requires on average a 10% increase in initial investments. In general, neither urban planning procedures nor the promoter's methods internalise these extra costs and therefore create barriers for innovation and energy efficiency. Given that the current replacement rate of buildings is 1-2 % per year, is conservatively estimated that it will be possible to save almost 20 Mtoe in 2005.

124. The use of solar energy in the thermal application itself has, not only in the southern countries, but in the whole of Europe, a very high potential for achieving substantial energy savings. Application of solar passive technologies are already saving the equivalent of 100 Mtoe. This contribution could be increased by 40% in 2005. Indeed, passive technologies are well developed at design level, but it is estimated that only 10% of architects implement passive solar techniques in their projects, partly due to a lack of integrated products but also due to uncertainty about the result.

In addition to the integration of new designs and passive solar technologies, there are some specific technologies which could penetrate the market. These are, for example; in space heating: condensing and high efficiency boilers, heat recovery systems, Variable Refrigerant Volume Systems (VRVS) for cooling and ventilation; new lighting equipment such as Compact Fluorescent lamps (CFL); Building Energy Management Systems (BEMS) for control. Depending on the rate of penetration in the market by those technologies, the expected savings of 50 Mtoe by 2005 represent 20% of total building energy consumption.

Transport

125. While energy demand has increased by 6.2 % in the Community between 1980 and 1991, transport sector energy demand has increased by 26.8%, the largest increase of any sector.

Balance of the transport sector			
Share in Total Final demand	Share in total CO_2	Road transport share	Private car share
31%	22%	78%	55%

126. Improvements are being made in fuel efficiency and marginally in fuel substitution (i.e. compressed natural gas) but remain marginal and are being outweighed by the growth in traffic. Nevertheless it seems necessary to set ambitious targets for reducing consumption and substituting oil derived fuels. In the present context, the major advances are:

-much improved organisation of transport systems, specially in urban areas;

-more efficient management of mass transit fleets, traffic and urban resources in general;

-more efficient vehicles and engines technologies (hybrid, electric vehicle,...);

-wider penetration of new and alternative fuels (CNG, Biofuels).

Based on present trends and existing best available technologies, a 20% increase in the individual engine efficiency can be achieved in the next ten years. However, the expected growth of traffic - the number of private cars should increase by 25% between now and 2005 - especially in the urban areas, implies that an energy saving policy in the transport sector is an absolute requirement.

Such a policy should be accompanied by measures in the field of tariffs (internalisation of external costs) and policies to modify behaviour in relation to public transport (to improve its availability and to prevent the use of private cars).

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A.4 Environmental protection

Traditional environmental energy issues have been supplemented by growing global environmental concerns, particularly those linked to climate change.

127. Many current environmental issues centre on energy production, transport and use. The traditional localised problems relating to spills, noise and amenity destruction, though still an area of ongoing concern and effort, are being tackled and a range of solutions are available. They have been supplanted as the source of major concern by environmental problems of a regional and, more recently, global nature which usually relate to pollution of the atmosphere.

- Energy use can result in pollution of a variety of media, and not just of the atmosphere. It is an issue in relation to aspects of waste disposal, in particular the question of the safe disposal of nuclear waste[23]. Water abstraction and thermal discharge are issues related to power generation. Coastal zones can be polluted by oil and there is a clear need to tackle problems of oil tanker safety at European Community level. These localised pollution issues can normally be handled in a straightforward manner as the source is known and can be regulated. Also with local pollution problems the concern is more concentrated and there is usually greater willingness to act. Effective action is however not always easy as examples of severe urban air pollution in some Member States show. While many aspects of such problems can best be tackled at the national or even local level, there is a Community dimension and also an internal market dimension which often requires intervention at the European level. The setting of car emission limits is a good example.

- Regional environmental problems like the acid rain issue are more difficult to deal with as emissions of SO_2 and NO_x may emanate from distant sources. Given the trans-boundary nature of these pollutants as well as internal market issues, action is needed at both European and international levels. In its approach to tackling these problems the Community, which is a party to the Convention of 1979 on long range trans-boundary pollution, has acceded to the Geneva NO_x Protocols and signed the VOCE and 2nd SO_2 Protocols.

  The emission of greenhouse gases such as CO_2, methane, NO_X etc. are global energy-related environmental problems. They are the subject of international agreements, such as the Global Convention on Climate Change which was ratified in December 1993. A long term integrated strategy is therefore necessary as defined in 1991 in the Community strategy for CO_2 emissions reduction. It does not matter where emissions

(23) The whole question of the safe disposal of nuclear waste has been addressed in the Commission communication for radioactive waste management COM (94) 66 final. A series of actions has been identified.

occur or where they are avoided and therefore it may be more efficient to first tackle those emissions that can be reduced at lowest cost wherever their sources are located.

- The development of electricity transmission infrastructures is also faced with environmental constraints. These constraints are the principal obstacle to ensuring that network capacities meet the needs of the market. And these constraints are even greater when the network has a cross-border dimension. This situation could effect the strategy of development of production capacity in the form of smaller units which are closer to the market.

A comprehensive strategy covering all pollutants is essential in order to arrive at an overall balanced abatement policy. There are many interrelations between different pollutants and removing a maximum amount of one of them out of the energy system may prove to have adverse effects on an overall balanced solution.

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A.5 The regional dimension, economic and social cohesion

The geographical distribution of the various energy-generating products is one of the instruments of regional development and of regional planning although economic development of the regions is a requirement for energy efficiency.

128. The regions of the Community are not on an equal footing. In particular, the disadvantaged regions are more dependent on energy imports than the Community average, as well other parameters, as the following table shows:

Energy indicators for the cohesion countries					
Indicator	Spain	Portugal	Greece	Ireland	EC
Consumption per capita (1)	2.1	1.5	2.3	2.7	3.6
Energy Intensity (2)	0.239	0.349	0.396	0.306	0.219
Dependence Rates (%)	67.6	96.7	76.2	77.7	51

(1) toe/Capita (2) toe/$1000 GDP

129. However, there is no relation between development level and consumption level. A study of the correlation between industrial value added and energy-intensity shows that, per unit of energy consumption, industrial value added increases when the energy-intensity decreases[24].

The reinforcement or the extension of infrastructures, just as a development of energy efficiency and of renewable energy, makes it possible to correct regional asymmetries, by giving the economic agents favourable conditions and by contributing to regional planning[25].

In Portugal, for example, the indicators available show the existence of an important divergence, for the energy sector, between this country and the Community average. In terms of source diversification, Portugal's gross domestic energy consumption in 1991 was 76.8% dependent on imports against 36% on average for the Community. The price of electricity to industry was, in 1992, 66% higher than the Community average. The introduction of

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(24) Socio-economic energy indicators in the European Community - Universitat Autonoma of Barcelona

(25) Commission communication on energy and economic and social cohesion in the Community COM (93) 645 final of the 14 February 1994

natural gas means that by the end of the century it will account for 7.5% of consumed energy against 18.6% for the Community. This will make it possible to reduce Portugal's energy-intensity, which in 1991 was 0.44 Mtoe per 1000 ECU of GDP compared to 0.3 Mtoe in the Community.

ANNEX B - ENERGY PROSPECTS

ENERGY PROSPECTS

B.1 General trends

B.2 The scenarios

B.3 The World: past and present

- 3.1 European Community
- 3.2 European Free Trade Association
- 3.3 Central and Eastern Europe

B.4 Energy future

- 4.1 Future world demand
- 4.2 Future European Community demand
- 4.3 Future world production
- 4.4 Future European Community production

B.1 General trends

World energy consumption will grow by 2% per year on average: Europe's demand will grow slowly, demand in the developing countries will grow faster;

Within 20 years:-

- **developing countries will account for the majority of growth of energy demand and CO_2 emissions**
- **physical availability of energy in unlikely to pose a constraint**
- **Community energy dependence could rise to 70%**
- **Community gas demand could grow by 60%**
- **Community electricity generating capacity could increase by 60%**

Much of the change will be in response to environmental pressures and in favour of new technological developments.

N.B. References to the European Community refer to 12 Member States.

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B.2. The scenarios

130. Understanding of the different worlds that could emerge over the longer time horizon requires the examination of distinct scenarios; within the context of each scenario a common energy agenda can be imposed. A number of variants will be introduced to test the sensitivity of energy options to a variety of influences.

Four basic energy scenarios have been developed. Three of them, called 'Battlefield', 'Forum', and 'Hypermarket' assume that global warming as a result of carbon dioxide emissions is proven by the middle of the next decade. A fourth, "Conventional Wisdom" is designed to evaluate the energy consequences of the pursuit of existing policies without any further new initiatives.

- In the **Battlefield** scenario the world reverts to isolationism, power blocks, and protectionism. Contradictions and instabilities in the global system make economic integration very difficult. Globalisation is seen as too ambitious. The geopolitical system fragments into blocs, with tensions and friction between and also within blocs.

- In **Forum** the world moves more to consensus and co-operative international structures with a strong role for public administration and intervention. The process of global integration produces new imperatives for collective public action. National, European and international institutions are gradually restructured so as to be able to deal more effectively with broader, more complex shared problems and interests.

- Under **Hypermarket** the predominant themes are market forces, liberalism and free trade; there is a minimum of intervention from government and public administrators. Global economic integration is self-reinforcing and continues. The force driving this scenario is continued application of the market mechanism which is seen as the best way to produce wealth and handle complexity and uncertainty. Liberalisation and privatisation deliver results and produce new market entrants who demand more of the same.

- The **Conventional Wisdom** scenario denotes the "business as usual" world, representing a conventional wisdom view of the most likely evolution of events. Economic growth gradually weakens as demographic changes mean slower growth in the labour force. Although some progress is made, many of the world's structural social and economic problems remain.

131. Considering all the factors together, future evolution of energy supply, demand patterns, lifestyle expectations, social and economic structures, and technologies, it is reasonable to conclude that much of the force for change would be in response to environmental pressures and in favour of new technological developments. It also needs to be recognised that the apparent calm of the energy sector today conceals tensions beneath the surface that, in the long term, will require resolution. While the question of how to respond meaningfully to the environmental issue holds the spotlight at present, the geopolitical situation in relation to the supply of various energy forms cannot be ignored and is likely to feature strongly over the long term.

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B.3 The world: past and present

World energy consumption grew by almost 2% p.a over the last 20 years;

Europe grew the least and the developing countries the most;

Oil remained the predominant energy source and the Middle East the predominant exporter;

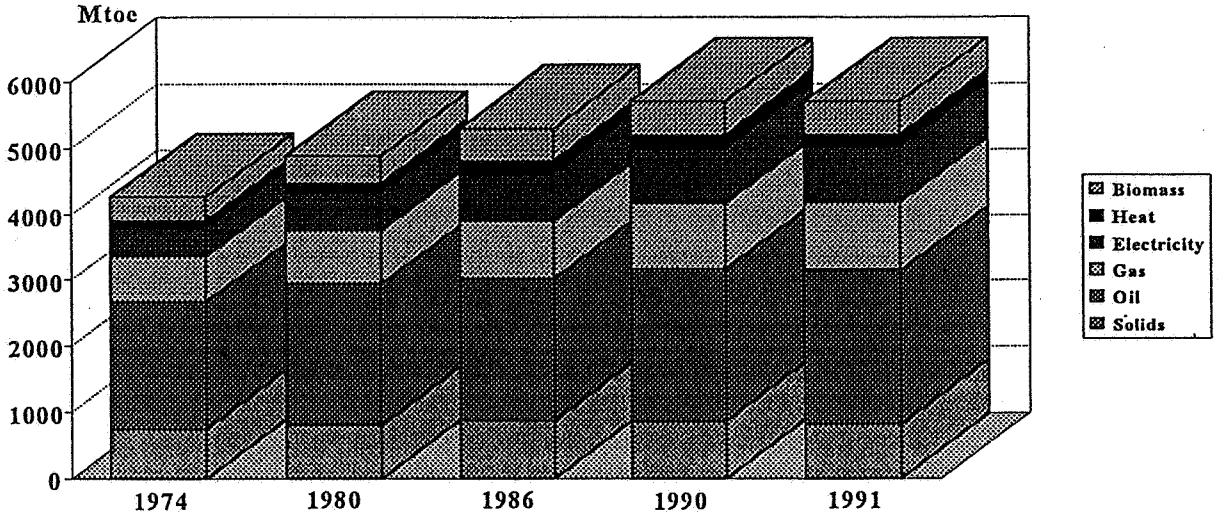
CO_2 emissions grew in line with increased energy use. But in Europe the rate was lower due to increased use of nuclear. In developing countries the increase in CO_2 emissions averaged 5% per year.

132. World energy **consumption** grew over the last twenty years by almost 2% per year. But there were clear regional differences. While OECD countries' demand grew significantly less than the average, Asian energy demand increased fastest in the whole period, at more than double the average.

The pattern of **CO_2 emissions** reflects the energy consumption trend. Total world-wide emissions steadily increased at nearly 2% annually. However, the developing countries show a steady increase of more than 5% per year in the last two decades. Today, they account for almost one third of the world emissions, compared with only one sixth in 1974.

133. **Oil** remained the predominant fuel, although it has lost share in total world consumption from around 50% in 1974 to under 40% in 1993. **Coal**, after steady growth in the last two decades, is now declining. **Natural gas** is showing strong growth in most sectors. The contribution of **Nuclear** appears to be reaching a plateau in many regions. **Renewable** energy sources grew at 3% per year in the period and account for 10% of total needs today.

WORLD
Final Energy Demand by Fuel



134. The Middle East remains the world's largest exporter, though Non-OECD regions are increasing in importance as energy producers, despite the decline in the former USSR and in Central and Eastern Europe. The European Community remains the world's largest energy importer. Just over half of Europe's energy supplies are imported. **Dependency** on external coal and oil supplies is increasing, as consumption is growing faster than domestic production. For natural gas the opposite is the case.

3.1. European Community

Wide diversity in the level of energy demand due to differences in geography; climate; economic structure; degree of industrialisation.

Common trend of growth in electricity and gas demand.

Common trend of a shift in supply patterns away from oil and coal.

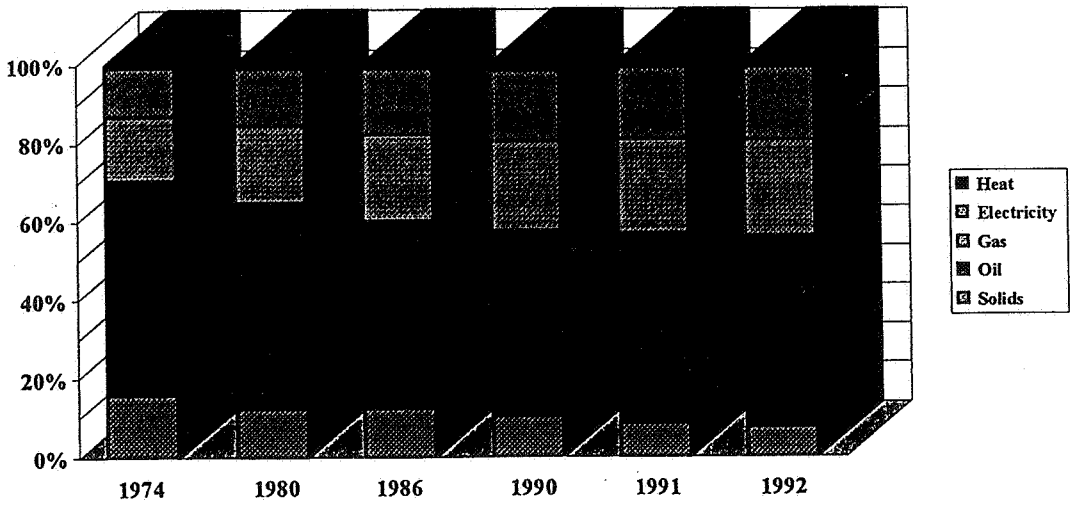
135. Total **final energy consumption** in the European Union as a whole increased steadily between 1974 and 1991 by about 0.6% per year on average. In this period, solid fuel demand fell some 42%, while oil consumption fluctuated around a slight decreasing trend. All other fuels contributed to the overall growth, with gas and electricity demand showing increments of 63% and 59% respectively.

Energy consumption in **Industry** decreased at a time when overall industrial activity increased, reflecting the changing structure of European industry during the period. **Transport** grew

steadily from 1974 at an annual average of 3%. In this sector, energy demand has grown faster than the overall economic activity implying that the consumer bought more cars, bigger cars and drove them further, masking the significant improvements in the specific consumption of new vehicles over the period. The **Domestic and Tertiary sectors** grew by 13% overall, but not in a steady way. Energy consumption in this sector is highly dependent on weather conditions (space heating) and thus can present some marked fluctuations.

Electricity consumption 1974 shows a steady increase of 2.7% per year on average. The European Community is effectively self-sufficient in electricity with less than 1% of total needs imported from Switzerland, Norway and Sweden. The evolving profile of generating capacity in the period reflects the significant growth in production from nuclear plants especially over the first half of the period. Hydropower and conventional thermal production increased only slightly. Oil input for power production dropped by 42% overall. Coal showed a steady increase in demand up to 1980, largely replacing oil. The much discussed "dash for gas" is a recent development and is not yet reflected in the statistics.

EUROPEAN UNION
Final Energy Demand: Fuel Shares



136. Average European energy **prices** have declined in real terms since 1986. For industry gas prices fell most rapidly, electricity least. There was some price convergence among Member States, except for solid fuels. In domestic and tertiary sectors oil prices have decreased faster than those of gas, electricity again showing smallest reductions.

Although no convergence is evident at the level end user tax-inclusive prices, a tendency towards a **single market** in some oil products is deduced in a recent study by the Royal Institute for International Affairs. The study examined the deviation in **pre-tax** petrol prices in Member States over time. Variance (expressed as the ratio of the standard deviation to the mean) fell steadily from 37% in 1984 to 15% in 1992. During the same period the variance between the rest of the OECD countries fluctuated between 24% and 17% ending up at 22% in 1992.

Gasoline - Variation in PPP adjusted price excluding taxes

YEAR	1984	1986	1988	1990	1991	1992
EU-12	37%	32%	31%	22%	18%	15%
Other OECD	28%	28%	21%	17%	20%	22%

The study concluded that increasing competition in the petrol market is reflected in price convergence between the Member States. The same study pointed out that the increasing competition in oil products in the Single European Market had enhanced the competitiveness of the European economy. In purchasing power parity terms the mean price of gasoline in Europe in 1984 was 20% above the rest of OECD, whereas by 1992 it was 2% below.

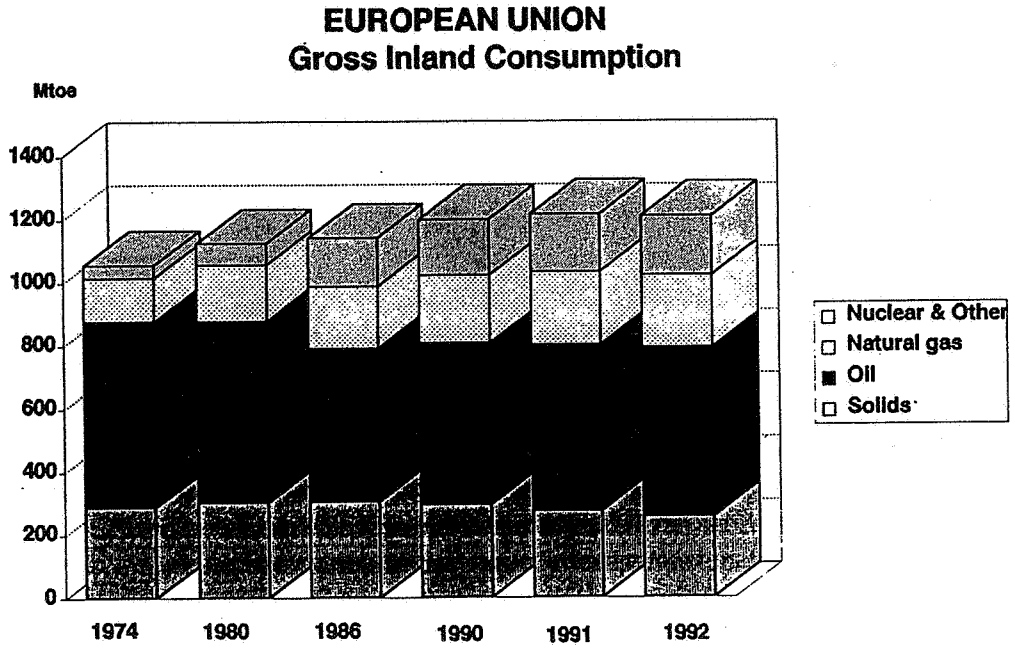
A similar comparison between competing energy fuels revealed that in Europe oil had a far lower price variance than either gas or electricity, both for industrial and domestic end users. The clear inference is that the single market being better established for oil than in the gas and electricity sectors produces more equitable prices for oil users in Europe.

European domestic and industrial energy prices variation

Price Variance in 1991	Domestic Sector	Industrial Sector
Heating oil/Light fuel oil	13%	14%
Natural gas	23%	41%
Electricity	37%	27%

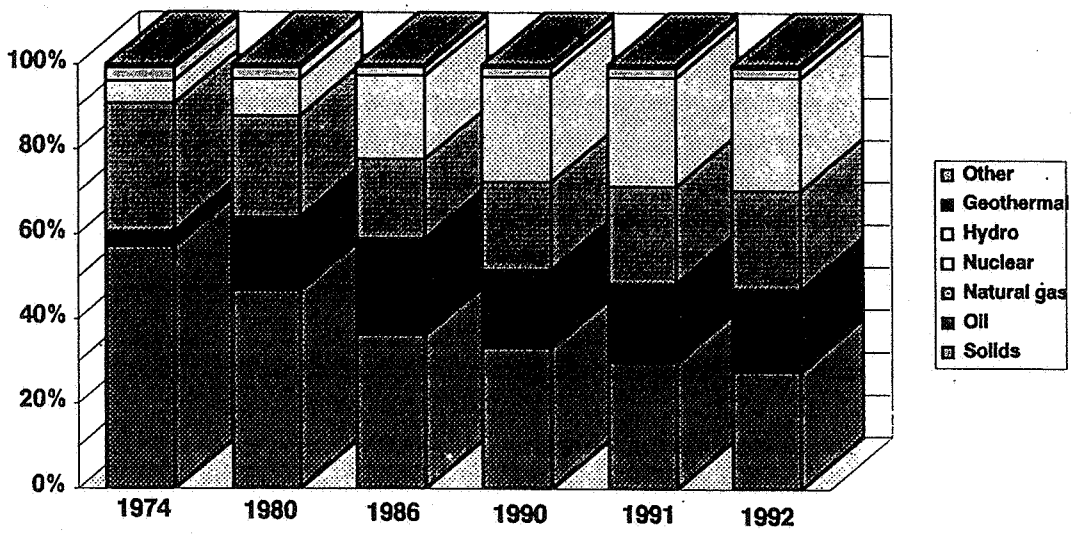
Note: Countries vary by sector and fuel according to data availability.

There are also positive signs of growing integration of the electricity market in Europe. During the period from 1985 to 1992 a steady increase in electricity trade was recorded between those Member States that have interconnected electricity grids. Transfers totalled 3224 Mtoe in 1986 and had increased to 6636 Mtoe by 1992.



137. Gross inland consumption of the European Community grew by 0.8% per year on average over the last 20 years. But the growth was not homogenous and large variations have occurred within the sectors. The increase in consumption for transport (26%) and for electricity generation (30%), more than made up for the drops in industry (-19%) and in the domestic and tertiary sector (-13%). There have also been significant changes in the fuel mix . Solid fuels use in power generation has gone up but this growth has been balanced by a reduction in industry, domestic and tertiary sectors. Oil consumption has recovered from the effects of the oil price shocks of the 1970's. The 60% drop in crude oil prices in 1986 and the continuing slight downward trend to 1993 was undoubtedly a contributing factor in this recovery. Natural gas demand grew the fastest among primary fossil fuels and in all Member States.

EUROPEAN UNION
Primary Production: Fuel Shares



138. **Domestic production of energy** in the European Community as a whole peaked at 682 Mtoe in 1986, some 60% higher than in 1974. This is due to a very significant increase in oil production that grew more than ten fold in this period more than making up for the loss in solid fuels production. After 1986, however, oil production dropped substantially to 1990 (down 24% compared to 1986) and in 1992 was still 21% below the 1986 peak. The production of natural gas shows an increase from 1974 to 1992. Nuclear had significant increases up to 1986. After 1986, the increase in nuclear output has been slowing down as only a small number of units have been commissioned.

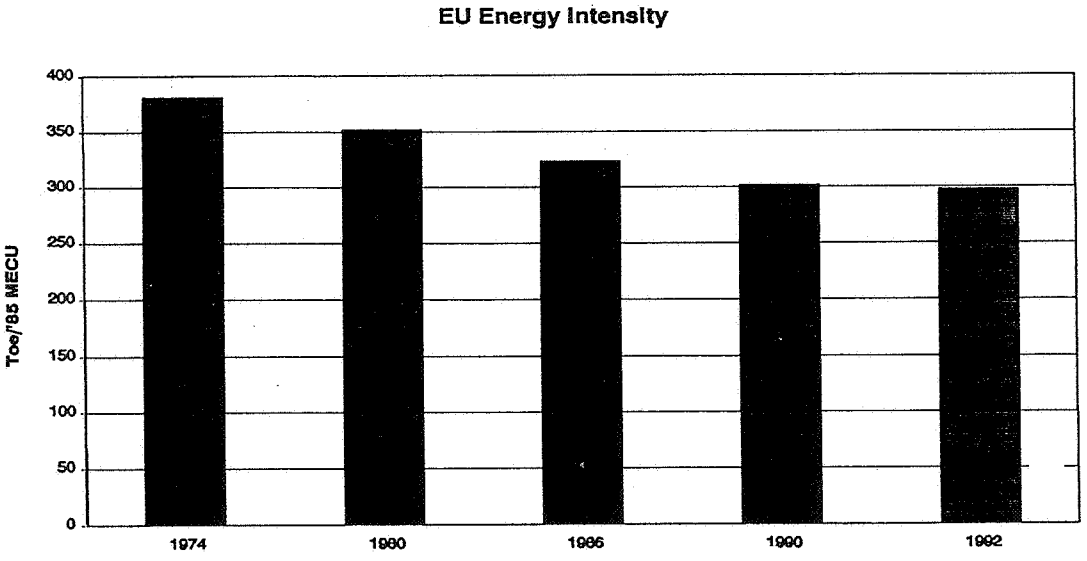
Degree of Self-Sufficiency in Energy Supply
(Total Domestic Production / Gross Consumption in %)

	1974	1980	1986	1990	1991	1992
Belgium	8	14	28	23	22	20
Denmark	0	1	25	50	57	59
France	14	21	44	44	44	45
Germany	53	49	55	55	47	45
Greece	4	15	29	35	34	28
Ireland	12	20	25	30	33	33
Italy	14	14	17	14	17	15
Luxembourg	2	0	0	1	1	0
Netherlands	93	93	82	77	82	83
Portugal	10	1	7	3	6	4
Spain	23	24	39	33	33	30
United Kingdom	48	94	117	97	95	96
Average European Community	38	46	57	52	50	49

The degree of self-sufficiency of the European Community as a whole increased significantly from 1974 to 1986. Since then it has fluctuated around the 50% level. Among the Member States, the Netherlands and the United Kingdom are the most self-sufficient. Denmark, which was totally dependent on imports in 1974, increased its level of self-sufficiency to almost 60% in 1992. In the cases of Belgium, France and Spain the levels of self-sufficiency are based mainly on nuclear energy.

The European Community imports about half of its total energy needs compared with two thirds twenty years ago. The greatest level of import dependence is for oil (78%) most of which comes from the Middle East. For solid fuels the level is 32% and increasing. The external dependency of the European Community in terms of natural gas was 36% (6% in 1974). In this case there are three suppliers, the former USSR with 16%; Algeria with 11%; and Norway with 9%.

139. Given that energy consumption is growing by almost 1% per year and economic activity increasing at slightly more than 2%, there is a long term trend of improving energy intensity. Intensity improvements in industry and to a less extent in power generation were the main drivers for the evolution of the overall energy intensity. The long-term trend of energy efficiency improvements is 1.4% per year on average, but there are significant differences among Member States and overall energy **efficiency** gains are slowing down. Most energy intensity gains were captured in the 1980 to 1986 period when industrial activity was flat and real prices increased significantly.



Significant deterioration in energy efficiency occurred in the transport sector with the ratio of transport energy demand to GDP up from 1.5 in 1974 to 1.8 today. While demand in the domestic sector is dominated by space heating needs more linked to weather conditions than to economic growth, consumption in the services sector over the past decades has increased in line with the growth of the services sector generally.

140. CO_2 emissions in Europe have grown more slowly than energy consumption. This was mainly due to the penetration of nuclear in power generation, to decreasing demand in industry and to higher penetration of gas and electricity in final demand sectors. The long-term trend since 1974 indicates a drop in the CO_2 intensity of the European Union energy system from almost 3t of CO_2 per toe in 1974 to 2.5t of CO_2 per toe in 1993. To a very large extent, the different behaviour of Member States in terms of total CO_2 emissions is a function of developments of the fuel mix for power generation, for example, France with 93 tonnes of CO_2 per GWh produced in 1992 against 869 tonnes of CO_2 per GWh produced in Denmark). In those Member States where nuclear energy was developed, such as in Belgium and France, CO_2 emissions from power generation dropped significantly by 48% and 60% in the period from 1980 to 1986 respectively.

3.2 European Free Trade Association

141. Final energy demand in the EFTA countries as a whole increased steadily since 1974 by 0.9% per year on average, or practically the same as in the whole of the European Community. This evolution is also characterised by a certain switching away from solids and oil. Electricity accounted for around 30% of total final demand in 1993 as against 20% in 1974, but seems to be stagnant since 1990. Gas, although showing fast growth (4.8% per year), accounted only for about 6% of total final demand in 1993. Heat has been the fastest growing energy vector with 7.5% per year over the period and satisfied almost 5% of demand in 1993. Biomass is the third most important fuel for final demand sectors after oil and electricity. In 1993 it accounted for more than 10% of demand, or almost double the share of gas.

In terms of energy intensity, almost all EFTA countries show improvements over the period. Switzerland has by far the lowest level with 182 toe/1985 MECU in 1992, or 66% of the EFTA average. In Norway there has been a steady decrease in intensity (1.4% per year).

142. Energy production in the EFTA countries is dominated by oil which accounted for more than 50% of total in 1993, and has increased since 1974 by 20% per year on average. Renewable energy sources (hydro, geothermal and biomass) rank second with 20% of total in 1993; the production of these sources increased on average by 2.5% per year over the period. Nuclear energy is the third more important domestic fuel with 13% of total in 1993. Natural gas production saw significant growth up to 1980 (53% per year), but has practically stagnated since then.

Electricity in the EFTA countries is generated mainly from hydro power and nuclear, with 64% and 25% of total generation respectively. While hydro power output has increased almost continuously, nuclear has virtually stagnated since 1986. However, this picture is not homogeneous across EFTA countries. In fact, electricity in Norway is practically all generated from hydro power, while in Finland nuclear production is higher than that from hydro. In Austria, there is no nuclear energy. In terms of fuel inputs for thermal generation, oil has lost share to gas, biomass, and even solids over the period.

143. As a whole, EFTA became a net exporter in the late 1980s and it has steadily increased its export volumes since then. Export volumes more than doubled from 1990 to 1992. These developments are due to a 120% increase in oil exports, while gas export volumes stagnated around 13 Mtoe. This evolution is due to Norway, which is an important supplier of oil and natural gas to the whole of Western Europe. Except for Austria, the overall energy dependency of EFTA countries shows a downward trend in the period. Norway is a net exporter and, in 1992, it exported almost six times more than its gross inland consumption.

Of the EFTA countries, Austria, Finland, and Sweden are to become Members of the European Union on 1 January 1995. If these countries had been Members of the European Community since 1974, total gross inland energy consumption would have been higher by 8% in 1974 and 9% in 1993. In fact, these three countries increased their energy consumption in the period faster than the European Community. While the overall increase for the European Community was 14% in the period, Austria, Finland, and Sweden increased their needs by 29%, 40%, and 25% respectively.

3.3 Central and Eastern Europe

This region includes the following countries: Albania, Bulgaria, the Czech Republic, Hungary, Poland, Romania, Hungary, the Slovak Republic, the Baltic Republics and the Republics of the former Yugoslavia. Many or all of these are aspirant members of an enlarged European Union.

The dependency of this region on external energy supplies was 25% in 1992 compared to 15% in 1974. Import dependency was as high as 29% in 1990 but fell subsequently. This is because there has been a considerable reduction in energy consumption resulting from the economic changes that have accompanied the lifting of the iron curtain.

Bulgaria is the most dependent on imports (52% in 1992), in spite of a reduction of dependency since 1974 (76%) due to penetration of nuclear energy and a significant decrease in primary energy needs. Coal-rich Poland has the lowest import dependency. Having been a net exporter of energy in 1974, the country was still only dependent on imports for 5% of its energy needs in 1992.

For a long time this region has been a net importer of crude oil and natural gas, mainly from the former USSR. However, until 1990, there was a small surplus of oil products for export. Oil imports represented 70% of total requirements in 1974 and 79% in 1992. This significant increase is due to a fast drop in domestic crude oil production, mainly in Romania where output dropped 55% in the period. Poland is a net exporter of coal, but volumes show a downward trend. Given the economic crisis faced by the region since the late 1980s, there is a common downward trend in both energy production and demand.

Final energy demand in Central and Eastern European peaked in 1986 and has declined since then. In 1991, total final energy demand was 27% below the 1986 level. This drop in demand was mainly at the expense of solids, oil, and, to a lesser extent, gas. Electricity consumption also peaked in 1986 and by 1991 had dropped slightly to 1980 levels.

Central and Eastern European countries are practically self-sufficient for electricity consumption. Generation is mainly based on thermal units. Nuclear and hydro power accounted for 13% and 12% respectively of total production in 1991. Fuel inputs for thermal power are dominated by solids (78% of total inputs in 1991) and these have increased significantly from 1974 to 1990.

In terms of gross inland energy consumption per capita, there has been a clear negative trend since 1986. The economic crisis associated has reduced living standards. Average consumption per capita in 1992 was 35% below the European Union average. Between 1986 and 1992, the strongest drop occurred in Albania (-61%) while in Hungary the fall was only 14%.

The energy intensity of these countries is more than three times higher than that of the European Union. Intensities peaked in 1980, improved to 1990 (i.e. energy used per unit of GDP fell) but have increased since then.

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B.4 Energy future

146. The Commission's previous review of the energy futures of the European Community, "A View to the Future", was published in 1992. In that review, detailed forecasts were made by fuel and by sector to the year 2005. The implications of some of the key trends for the year 2050 were also highlighted. As the Community energy policy debate progressed, it was felt that the next step should be to take the detailed examination of the trends and their potential consequences to a further point in the future. Thus the ongoing detailed study to 2020 was conceived. In specifying the project, it was felt that the single point forecast approach used in "A View to the Future" constrained the range of thinking - a scenario approach would provide a better guide to the range of future trends against which policy options would have to remain robust.

Three main scenarios were defined and specified in terms of broad sociological and political parameters. The economic and energy aspects of these scenarios are now being set out and evaluated. In the meantime, work is more advanced on a fourth "business as usual" scenario, consistent with the other scenarios in conception, but in line with current conventional wisdom, rather than the deliberate stretching of assumptions that is going into the main scenarios. Results are now available from this "Conventional Wisdom" scenario and a summary of the key findings follows here.

Detailed prospects for energy are considered here only for the medium term, generally focusing on the middle of the next decade. Detailed results beyond the middle of the next decade are more appropriate to the scenario approach and are better explored when the three main scenarios are fully agreed and analysed. Nonetheless, a brief summary of the key long term energy is given in the main body of this paper.

While the following prognosis is based principally on the Commission services own work, account has also been taken of the conclusions of other forecasts available to the Commission services or in the public domain. Notably, these are from government agencies; the IEA; industry associations such as Eurogas and Eurelectric; and both public and private organisations such as the World Energy Council and DRI/McGraw-Hill.

4.1 Future world demand

World energy demand could grow at 2% p.a. over the coming decade;

Strongest growth will be in the developing countries, particularly those in the Far East;

Considerable uncertainty surrounds the prospects for energy demand growth in the former Soviet Union and Central Europe;

There will be changes in the global fuel mix, with gas gaining share at the expense of oil and coal.

147. On the assumption that there will be no major unforeseen discontinuities, it is conventional wisdom that the prospects are for world economic growth over the next decade to be between 3.5% and 4% p.a.. Economic recovery is currently progressing in the industrialised world with steady growth and low inflation in prospect for the coming two years. Growth could slow as the decade progresses but, although modest by historic standards, still average around 2.5% p.a.. The developing world is expected to be particularly strong, potentially growing at over 5% p.a., led by the fast rising Asian economies.

148. The cost of energy supplies can be expected to increase in real terms, albeit moderately. Oil is generally expected to continue to set world energy prices. Rising demand for oil and relatively static supplies from non-OPEC sources are likely to gradually tighten the global supply/demand balance. There will be increasing requirements for supplies from OPEC countries, particularly those in the Middle East, so facilitating the effective management of the global oil market and oil prices by these relatively few producers. Nonetheless, price rises are expected to progress moderately. Producers are unlikely to wish to see a repeat of the damaging impact on the world economy that resulted from the oil shocks of the past. Gas prices can be expected to remain pegged to oil, with higher prices necessary in the future to ensure the development of the large, but increasingly inaccessible, global reserves in order to meet rising demand. Only coal prices remain relatively flat as abundant supplies of low cost coal will be available to world markets from the high volume, low cost, producers of North America, Asia and Australasia.

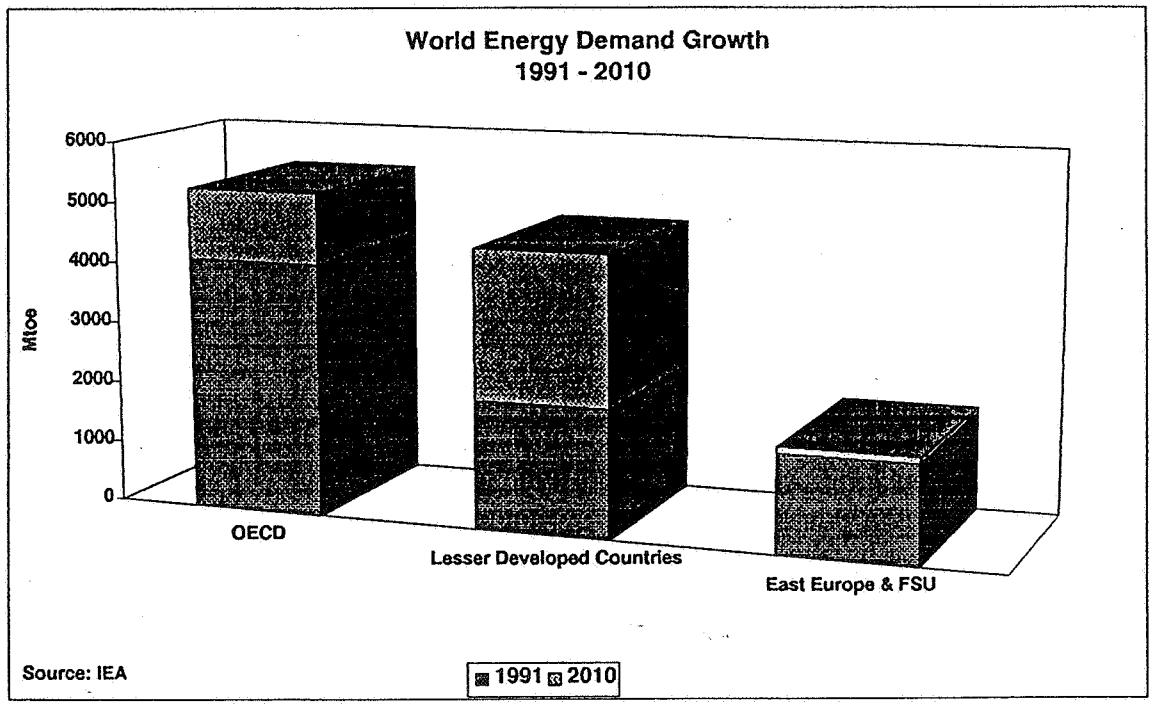
149. However, global energy resources are abundant and it is increasingly believed that energy costs could remain at today's low levels for some considerable time to come. Oil supplies have historically tended to exceed demand and technology advances are sustaining that trend. In the longer term gas prices could increasingly decouple from oil prices and compete with low cost coal, rather than oil, as it is already doing in the US.

150. World energy consumption more than doubled over the last three decades, reaching 8.4 btoe in 1990. Between 1974, the year following the first major oil price shock, and 1992, the annual rate of growth was almost 2%. Growth has recently ceased because of declining

underlying trend will be restored and demand for energy can be expected to grow again. The IEA estimate that energy could grow at 2% each year over the next 10 to 15 years.

Although demand for energy is expected to rise in the industrialised world, it is the developing world that will show the most spectacular gains. The rise in non-OECD energy consumption will outstrip that of the OECD by a considerable margin as a result of population growth, increasing industrialisation and urbanisation, spreading transport needs and a dwindling availability of non-commercial energy sources. In 1990, the developing world, outside of the countries of the OECD and the former Iron Curtain, accounted for 75% of the world's population and yet took only 25% of the total primary energy consumption. According to the IEA, by the year 2010 the developing world will account for over 80% of the world's population and it will probably be responsible for 40% of world annual energy consumption.

Overall OECD energy growth is forecast by the IEA to grow at 1.3% p.a. between 1991 and 2010. Outside the OECD, while Central, Eastern and former-Soviet Union energy growth takes some years to recover (and so are only forecast to increase at an average of 0.3 % p.a. between 1991 and 2010), it is the developing world which will achieve the spectacular growth - over 4% p.a.. Current OECD energy consumption is roughly double that of the developing world, yet the increase in energy demand growth forecast for the developing countries is more than twice that of the OECD:



151. In particular, it is the developing countries of the Pacific Rim which have led economic and energy consumption growth in recent years and they are expected to continue to do so in the future. Energy demand growth in East and South Asia could average up to 5% p.a. over the next 15 to 20 years. Here the "tiger" economies, or Newly Industrialised Economies (NICs) - South Korea, Taiwan, Hong Kong and Singapore - are now reaching a state of economic

South Korea, Taiwan, Hong Kong and Singapore - are now reaching a state of economic development equal to that of European Countries. Indeed, South Korea has now joined the developed countries "club", the OECD.

The world's third largest energy market, China, is of particular importance. The rapid rate of economic development in China is leading to important changes in energy markets in the region and potentially around the world. In fact China may be unable to maintain the recent high rates of economic growth because of energy constraints. Although still a coal economy (three quarters of primary energy consumption is coal), oil has been supplying the incremental demand for energy both in the transport sector and in the power sector where it acts as the marginal fuel in helping to alleviate regional coal and electricity shortages. In recent years, this accelerating growth in demand for oil has been outstripping only modest increases in domestic oil production. In 1993, China became a net oil importer once again - the first time since the early 1970s. China's oil imports could easily exceed 1 mb/d (50 mte p.a.) by the end of the century and further double over the following ten years.

Elsewhere in the developing world, the rate of energy demand growth will outstrip that of the OECD, albeit from a smaller base. The Middle East energy demand is expected to grow at rates little short of those of the Far East. Industrialisation and infrastructure investment in the Middle East - both highly energy intensive processes - will continue in spite of the constraints of lower inflows of oil revenues than in the past. Across the region, energy costs will tend to continue to be heavily subsidised compared to world prices, providing little incentive to improve energy efficiency. Africa is forecast to grow the least strongly in the developing world, a reflection of the deep-seated economic ills that are likely to continue to blight the continent.

152. Work by the Observatoire Méditerranéen de l'Energie (OME) for the Commission on the Mediterranean region (i.e., North Africa and the Middle East) has indicated the importance of this close neighbouring region to Europe in energy terms. The population growth in North Africa will require a significant acceleration of economic development in order to provide employment and meet the growing domestic energy needs. As well as the whole region remaining a major source of hydrocarbons, North Africa will grow increasingly important in the transhipment of energy, notably natural gas, to Europe.

Latin America will fare somewhat better than Africa, although energy growth is likely to lag behind that of the Far East as foreign debt and other economic difficulties constrain development.

153. But the greatest uncertainties surround the Former Soviet Union (FSU) and Central Europe. Analysis by PlanEcon for the Commission has highlighted that the shock of market transition following the fall of communism has meant a rapid drop in economic activity over the past few years. Energy production in the FSU has slumped - mostly in oil. Gas production has been much less affected so far. Energy exports have also fallen, again mostly in oil. Although some of the former communist East European countries are already showing signs of recovery, positive GDP is unlikely in the region as a whole until the latter half of the nineties, depending in the success or otherwise of economic reforms. Although PlanEcon foresee positive growth in FSU energy production and consumption towards the end of the current decade, great difficulties surround the prediction of the development of the former

Soviet Union's huge hydrocarbon reserves and the huge potential for changes in the energy demand mix and the efficiency of its use. Further work complementary to the Commission s proposed scenario approach is being undertaken by PlanEcon.

154. The global fuel mix will continue to change over the next 10 to 15 years, although without the expectation of the sort of price shock seen in the past two decades, the changes will in all probability be evolutionary rather than revolutionary:

- In the OECD, oil will continue to be increasingly concentrated in the growing transport sector, offsetting declining demand in other sectors. In the developing world demand will grow in all sectors because of the burgeoning need for energy in general and the lack of suitable alternatives to oil in many parts of the world. Transport sector growth will be the strongest. Although world oil demand will continue to increase, it will be outstripped by the other main primary energy sources, particularly gas. While losing share, oil will remain the most important source of world energy.

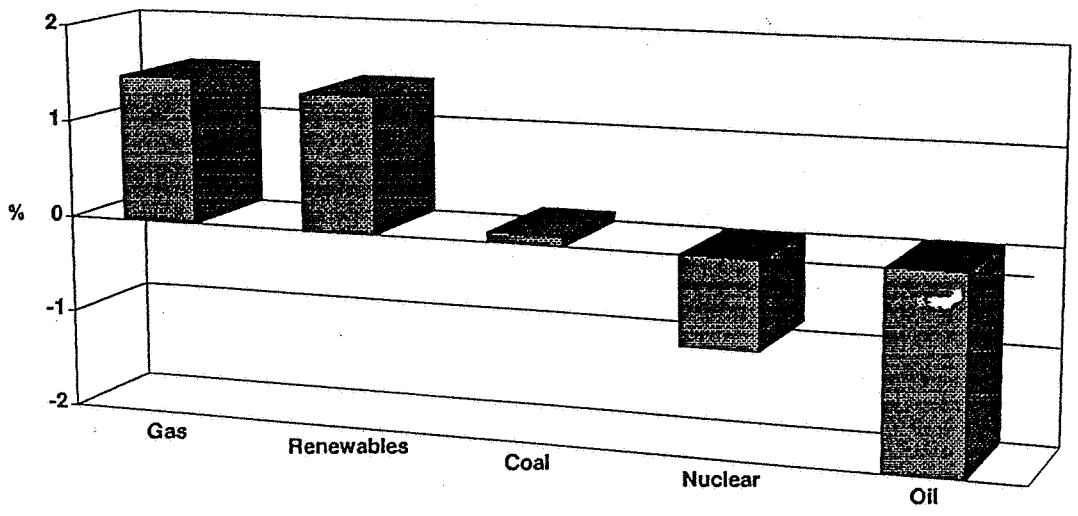
- Because of its high cost of transportation, gas will remain a regional fuel, although available in ever increasing quantities. However, it is forecast to be the fastest growing fuel in the medium term. In the developed world, its environmental advantages combined with the lower capital costs associated with its use will make it the first choice in non-transport sectors, particularly electricity generation. In the developing world and the former Soviet Union it will be used for preference where it is available. In particular, in energy producing countries, where it is frequently associated with oil reserves, gas will be used in preference to oil in order to release more easily transported and traded oil for export.

- Much of the world's vast reserves of solid fuel can be brought to market at considerably lower cost than the other main sources of primary energy. Consequently, in regions where environmental concerns are of less importance than the provision of cheap energy to underpin economic development, coal is a particularly attractive fuel, most notably for heavy industry and power generation. However, pollution will increasingly become an issue for the developing world as well as the OECD, limiting the opportunities for coal in the medium term. Nonetheless, coal can be expected to maintain its share of global energy supply, its inherent price advantage being reinforced over time should oil and gas prices rise in reflection of tightening supplies. In the long run, clean burn coal technologies should become widely and economically available. Coal will always remain at a disadvantage with regard to CO_2 emissions because of its higher carbon content and therefore higher CO_2 emissions, unless those new technologies include suitable means of extraction and disposal of this gas.

- The nuclear share of world primary energy is set to decline in the long term. 80% of world nuclear energy supply is in the OECD where nuclear power generation capacity growth is already slowing considerably. Without further replacement investment, it is set to come to a halt in the next 10 to 15 years. Elsewhere in the world, the growth in nuclear energy is continuing in the medium term and the investment slowdown will take longer to have an impact .

Although the contribution of renewable energies is likely to remain limited, reflecting problems of economics and market penetration, they could still increase their world share by as much as gas, albeit from very small base.

Change in World Primary Energy Shares
1991-2010



Source: IEA

4.2 Future European Community Demand

European Union energy consumption can be expected to continue to grow moderately over the coming decade;

Natural gas will be the fastest growing fuel, oil the slowest but retaining the largest share of primary energy consumption;

Transport growth is likely to continue. Domestic and services sector demand could grow at almost the same rate but industrial demand is expected to remain flat;

Electricity consumption is expected to increase at twice the rate of final energy consumption.

155. There is the expectation of sustained and reasonable economic growth across the European Community, particularly in the latter half of the 1990s as the European economy rebounds from recession, GDP growth averaging perhaps 2.5% p.a. between 1995 and 2000. Towards the longer term, growth falls back as the productivity of labour and capital slows. With no radical changes in environmental or other energy policies, energy consumption can be expected to continue to grow moderately over the next ten years or so:

- Gross primary energy consumption in the European Community 12 could rise at a little over 1% p.a.. The relatively small amount of energy consumed by the three new members to the EU will not affect the overall growth rate although their energy consumption is expected to increase at only half the rate of the Community 12.

- The overall intensity of energy use in the economy of the Community will continue to improve as a result of structural economic changes and more efficient utilisation - albeit at a lower rate than in the recent past. The amount of energy used per unit of GDP could fall by around 1% p.a. over the next 10 to 15 years.

156. Natural gas is expected to continue to be the fastest growing fuel. Oil is forecast to be the slowest but retains the largest share of primary energy consumption, while growth in coal consumption is expected to be only slightly ahead of oil.

- As a result of the "dash for gas", mainly in the power generation sector, natural gas has the potential for the fastest rate of growth over the medium term. By 2005, demand could be some 40% higher than in 1992, an average increase of almost 3% p.a..

- Solid fuels are forecast to grow at less than 1% p.a. as gas takes the major share of incremental electricity generation demand.

- Oil is predicted to rise by only 0.5% p.a., with falls in power generation and the domestic and services sectors offsetting transport fuels growth. However, oil is still expected to account for 40% of total primary energy consumption in 2005 (compared to 43% in 1992). Oil and gas together are expected to account for two thirds of the Community's incremental demand for primary energy between 1992 and 2005.

- Nuclear energy is forecast to grow at around 1% p.a. for the next 10 years or so as a result of operating improvements and the commissioning of plant firmly planned or under construction. However, with increasing decommissioning of an ageing nuclear power plant population, and no major plans for replacement, nuclear power will eventually decline in the longer term.

157. In the sectors of final energy consumption, transport growth is likely to be most strong but with the domestic and services sector not far behind. Industrial demand growth is expected to be the weakest:

- Community final energy consumption is expected to grow by perhaps 1% p.a. to 2005. Strongest growth is seen in the transport sector (around 1.5% p.a.) which consequently increases its share of final energy consumption to around one third by 2005.

- Domestic and tertiary sector energy consumption is forecast to grow by a little under 1% p.a.. Industrial demand growth could average 0.5% each year between 1992 and 2005.

- Electricity consumption may rise by about 2% p.a., twice the annual rate of growth of final energy.

4.3 Future world production

Global energy reserves are generally considered to be sufficient;

Solid fuel reserves are the most plenteous. There are significant global natural gas reserves, much of which are within reach of Europe. Oil reserves have the lowest expectation of life at current rates of consumption. A large part of the oil reserves are in the Middle East;

World oil trade patterns are likely to change as a result of rapidly increasing Far Eastern demand for oil and rising OECD import dependency.

158. Following the oil shocks of 1973 and 1980, long run adjustments have now been made and energy supply and demand have achieved a new balance. As a result global energy reserves are considered adequate and are unlikely to pose a physical constraint in the medium term. But notwithstanding this seeming stability there are major energy supply issues to be considered and significant tensions to be resolved:

World proven reserves of solid fuels (at present rates of production) extend to over 200 years. Proven gas reserves extend to some 65 years. These have been growing recently in parallel with the big increase in demand for this fuel. 70% of world gas reserves which are located in the Former Soviet Union or the Middle East, much of which are within range to economically supply western or central Europe. Uranium reserves appear to be adequate for the foreseeable future.

Proven oil reserves are some 45 years. This is certainly the lowest resources/production ratio (proven reserves to current rate of production) among the fossil fuels, although these oil reserves are equivalent in energy terms to the gas reserves (c. 135 Btoe). However, new discoveries have exceeded consumption for many years - proven reserves have trebled since the mid-1960s. 65% of the reserves are held in the Middle East and a further 11% in Venezuela and Mexico.

Reserves/Production Ratios for Fossil Fuels at end-1993

	LDCs	E Europe and ex-USSR	OECD	World
Oil	61	20	10	43
Natural Gas	232	69	15	65
Coal	161	329	262	236

Source: BP Statistical Review of World Energy

159. Coal and gas tend to be used within the regions of production, whereas oil is physically traded around the globe. This brings uncertainty about the impact of the changing shift in world demand for oil. Oil demand will grow strongly, particularly in China, India and other fast developing Far East countries. So although there is unlikely to be a shortage of oil in the medium term, there could be growing competition from the emerging economies, particularly as both the US and Europe face increasing dependency on imported energy:

- Although historical rich in energy, the US has become increasingly dependent on imported oil as demand has grown and its domestic resources have matured. Oil production has declined since the mid-1980s. The long standing surplus of indigenous natural gas supply over demand has now disappeared and the prospects are for rising imports of this fuel too.

- Japan has never been endowed with an abundance of indigenous energy resources and has built its post war boom economy on imported energy. Its total energy imports are not as great as those of Europe but exceed those of the United States. However, the rate of growth of energy imports since 1985 has been lower than both Europe or the US since Japan has not had the problem of declining domestic energy production to increase the effect of rising consumption.

4.4 Future European Community Production

Europe has significant coal resources although these will be decreasingly exploited.

Oil and gas reserves, although modest by world standards, are expected to remain a significant indigenous energy resource;

Community energy production is expected to fall only slightly in the medium term as decreasing coal and oil production is balanced by increasing gas and nuclear primary energy production. The role of renewables remains small.

160. Europe has been deficit in energy for many years, in spite of a long established and substantial domestic coal industry, and, in more recent years, the development of major oil and gas reserves in North West Europe and a major nuclear power industry. But with economic pressures reducing the coal industry, with domestic oil and gas production approaching maturity and, in the longer term, the prospects of a declining nuclear capacity, so the dependence of Europe on energy imports will continue to increase.

- Most of Europe's solid fuel reserves are concentrated in Germany. They account for 9% of the world's total and have an reserve to production (R/P) ratio of 190 years based on prices currently paid for domestic coal in Germany.

- Natural gas reserves in Europe are 4% of the world's total and can be expected to last 26 years at current rates of consumption. Norway and the Netherlands share the largest reserves, together accounting for three quarters of the European total.

- European proven oil reserves are less than half of the gas reserves (2.2 btoe versus 5.0 btoe of gas) just over half of which are held by Norway. The R/P ratio is just 9 years, although reserves are being replaced almost as fast as they are being used so taking probable reserves into account, the actual life will be considerably longer.

161. Energy production in the Community peaked in 1986 and can be expected to continue to fall. However, in the medium term, the decline will be modest as falling production of coal and, to a lesser extent, oil will be substantially offset by increases in production of the other primary fuels, notably gas:

- Community 12 energy production is forecast to fall by a little under 0.5% p.a. between 1992 and 2005.

- Community 12 solid fuel production has been falling since the early 1980s as expensive domestic production has been displaced by cheaper imports. By 2005, EU 12 production could be only 60% of the 1992 level and 40% of its historical peak. Coal production is negligible in the four candidate countries.

- North Sea oil production peaked in the mid-1980s and fell back quite rapidly over the following few years. Although current output is some 20% below the maximum, production has actually been increasing since 1991 as technological advances in exploration and production have allowed new smaller fields to be brought on stream economically while enhancing recovery from existing fields. As a result, decline is not expected to set in again until the late-1990s and by 2005, overall Community 12 oil production is anticipated to be only 6% below the 1992 production of 120 mtes.

- Community natural gas production has pursued a much more consistent path than that of oil and is not expected to peak until around 2005 at about 170 mtoe. Rising demand has stimulated the development of an increasingly sophisticated supply infrastructure to bring supplies from the Community and Norwegian North Sea reserves as well as to distribute imports from North Africa and the former Soviet Union.

- In the longer term a key variable in the Community's energy future will be that of nuclear power. The medium term prospects are for a continuing increase in supply. Although effectively limited to just six of the present twelve Member States, nuclear power accounted for a quarter of the total primary energy supply of the Union in 1992. The boom period in nuclear power station building is well past - only in France is any new building likely to take place. Nonetheless, existing plant, plus building in hand, will be sufficient to ensure that nuclear capacity will go on increasing for the next decade. It is only after 2010 that the nuclear parc is likely to show any significant decline, raising the question of what will replace it.

162. Import dependency of the Community will increase moderately in the medium term:

- Rising Community energy demand and declining domestic primary energy production will result in an increasing reliance on imports from third countries, notably the Middle East and the former Soviet Union, for supplies after 2000. The dependency of the EU 12 on imported energy (i.e. energy imports as a percentage of gross inland energy consumption) currently stands at 50%. Although only slightly higher by 2000, dependency could reach 55% by 2005, accelerating thereafter.

- The main change in import dependency is in coal - as domestic production declines, Community 12 imports rise from 35% to 65% by 2005. In this time horizon, oil import dependency is virtually unchanged at 80%. Gas dependency was 40% in 1992 and the strong demand growth forecast for the next ten years increases that figure to a little under 50%.

ANNEX C - COMMUNITY POLICIES

COMMUNITY POLICIES

C.1 The internal market

- 1.1 Opening the markets
  - 1.1.1 Free energy exchanges
  - 1.1.2 Removal of barriers
  - 1.1.3 Competition
  - 1.1.4 State aids
  - 1.1.5 Public contracts
- 1.2 Monitoring the markets
- 1.3 Crisis measures

C.2 The regional dimension and economic and social cohesion

C.3 Trans-european networks

C.4 Commercial Policy

C.5 Cooperation with third countries

- 5.1 Cooperation agreements with third countries
- 5.2 Specific energy instruments
- 5.3 Relations with international organizations

C.6 Environmental protection

- 6.1 Regulatory measures
- 6.2 Financial support

6.3 Fiscal measures

6.4 Actions carried out by industry

C.7 Research and technological development (RTD) Policy

C.1 The internal market

The internal energy market still needs to be completed, especially in the gas and electricity sectors.

In parallel to the adoption of secondary Community legislation for common rules on the internal energy market the process of harmonization and standardization needs to be vigorously pursued to ensure a level playing field for competition.

Clear and common rules need to be established to clarify which obligations the operation of services of general economic interest imply for the undertakings in the energy sector and how far derogations might be justified.

Transparency instruments for prices, investments and imports/exports are in place.

The organisation of oil security stocks need to be reviewed to enable industry to better benefit from an internal market.

163. Throughout the world, energy markets, especially electricity and gas markets, are being restructured. This is in response to the introduction of competition between producers; increased transparency of organisation and functioning of energy industries; the definition of the role and intervention of public authorities; and progress towards privatisation. Examples include Australia, New Zealand, the United States, Chile, Norway, Sweden, Finland, etc.. The structure of the electricity sector is being modified in Denmark, Spain, Ireland, Portugal and Switzerland. The United Kingdom electricity sector has been privatized and Italy is engaged in the same process.

164. Except for coal and nuclear, all fuels and activities of the energy sector are governed by the general provisions of the Community Treaty. For the European Community the question is not whether to complete the internal market but how to do so in the most efficient manner. In 1990/91 during the first phase of market liberalisation, the Council adopted a Directive on price transparency of gas and electricity prices for industrial consumers (90/377 EEC) as well as Directives on the transit of gas and electricity (91/296/EEC and 90/547/EEC). The second phase included the adoption in 1994 of a Directive on the conditions for granting and using authorizations for the exploration and production of hydrocarbons. Proposals for Directives for common rules for the internal market for electricity and gas were already presented in May 1992, and have been modified in December 1993 following discussion by the European Parliament. These amended proposals aim for greater competition at the production level and the introduction of increased consumer choice of gas and electricity supplies through negotiated access to the gas and electricity transport/distribution systems.

1.1 Opening of the markets

165. The Treaty of European Community provides that the market is the best means to efficiently allocate resources, to integrate economies of Member States and to promote sustainable and non-inflationary growth. Art. 7a requires the Community to establish the internal market and Art. 129b requests the Community to contribute to the development of trans-European energy networks within the framework of a system of open and competitive markets. However, the Treaty itself foresees exceptions to the free movement of goods which must nevertheless be interpreted in a restrictive way.

1.1.1 Free energy exchanges

166. Freedom of movement of products is a cornerstone of Community policy. The integration of the energy market by either harmonization, mutual recognition, or direct application of the rules of the Treaty, establishes the mechanism for cooperation between companies and the basis for their competitiveness on the world markets.

But the energy sector does not benefit from this integration. The wide variation between each Member State's energy sector and the diversity of their regulatory frameworks allows the use of security of supply or protection of public service obligation excuses to be used to refuse mutual recognition of national regimes. The level of integration of the markets varies according to energy product:

- The world market for *coal*, of which the Community market is a part, is a stable market, characterized by abundance of resources and major geopolitical diversity in terms of supply, even with the possibility of increasing demand in the long run, there is little risk of supply disruption. The operation of the internal market remains affected by aid for coal use in certain Member States (Spain, United Kingdom and Germany). However, the impact of this aid is limited because 45% of coal consumption is imported. In addition, this aid has to be consistent with the Community objective of the phased reduction and transparency of such aid and the requirement that Community coal prices be related to international coal prices, thus guaranteeing the eventual development of the internal energy market for coal.

- The *oil* market is a world market in which prices are determined by competition thanks to multiplicity of producing regions and of suppliers. It is the only field in which the Community has been able to make the rules of freedom of movement prevail through the adjustment of oil monopolies and the suppression of obstacles to trade in refined products by harmonization, standardization and the application of Article 30. However the correct operation of the market is affected by two distorting factors:

  . indirect taxation creates distortions in consumer prices. These distortions particularly affect heating oil and other fuel markets. However, it must be

noted that the revision mechanism according to the Directive on excise duties [26] provides a means of adjusting the competitive relationship between these products and of correcting any unjustified distortion which might exist;

- the organization of oil stocks in response to supply crises creates costs for the oil industry because the present method of stock management is not integrated at a European level. The single market would allow greater rationalization of the management of stocks and remove distortions caused by different management methods between Member States which particularly affect small and medium enterprises (SME).

- the world *gas* market, contrary to that of oil, is divided into several regional markets, each having its own characteristics. From the point of view of the internal market, companies operate in national markets, protected either by the presence of public-sector monopoly companies or by the operating conditions of the transmission and distribution networks. Undoubtedly exchanges between companies have been facilitated by the development of trans-european networks and by the community system of transit. However, these facilities do not directly benefit consumers, whose freedom of choice remains limited;

- exchanges of *electricity* between companies organized within the UCPTE, or under the directive on electricity transit, are limited by insufficient interconnection capacities and by the low level of cross-border trade.

- the *nuclear fuel* market functions in an integrated way in that imports are supervised by the Supply Agency and intercommunity trade is placed under its responsibility.

167. The legal instruments for the functioning of the internal market are already in existence: Articles 30 to 36 and Article 37 prohibit any measures by Member States which either directly or indirectly, actually or potentially, constitute a barrier to intra-Community trade. Application of primary Community law will ensure open market structures. However, Member States have adopted a large variety of national measures creating restraints on the free movement of goods. Furthermore, such prohibitions or restrictions shall not constitute a means of arbitrary discrimination or a disguised restriction on trade. Within the internal energy market the notion of security of supply will certainly have to go beyond national supply considerations. Therefore, it seems to be necessary to clearly define the subject of security of supply so as to have clear, transparent and controllable framework conditions for energy exchanges. The issue of whether services of general economic interest (as mentioned in Art. 90 E) could also result in justifications for restrictions to the free movement of goods has also been raised. However, even where such additional trade restrictions are justified, they have to be in pursuit of a legitimate aim and must respect subsidiarity.

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(26) DIRECTIVE 92/82/EEC, AGENDA NO L 316, 31.10., P19

1.1.2 Removal of barriers

The approximation of legislation

168. The approximation of legislation across the Community has two different objectives; the free movement of goods and the suppression of distortions of competition. To address these, the Community can rely on the harmonization instruments, Article 100A and Article 99.

- Free movement of goods does not exclude respect and protection - within the limits laid down in the Treaty and as interpreted by the Court - of the public interest in areas such as public health, environmental protection, security of supply (in that an interruption in the energy supply can endanger public safety), or public service issues such as they may be defined;

  . Article 100A until now was used only to harmonize the technical specifications of petroleum products and boilers with a view to greater environmental protection and energy efficiency. It is, however, available to permit whatever harmonization is necessary to meet the requirements of the protection of public service missions and of security of supply.

  . Article 99 provides for harmonization of the basis and rates of indirect taxation. Despite the establishment of minimum excise duty rates for mineral oils by the directive 92/82/EEC (which entered into force on 1 January 1993 as the first stage in the harmonisation process and whose only objective was the ending of border controls without damage to public budgets), it must be noted that there has been no convergence of the actual rates which are often at a higher level than the minimum rates. Thus, for example, the rate applied to unleaded petrol in the Member States varied in June 1994 between ECU 304 and ECU 517 per 1000 litre, while the minimum rate provided for by the directive is of ECU 287 per 1000 litre. Indirect taxes on gas products also cause price differences between Member States. However, it should be noted that the biannual mechanism of Article 10 of Directive 92/82/EEC provides a means of adjusting the minimum rates of excise duties to improve the operation of the internal market. This revision mechanism requires that the broader objectives of the Treaty be equally taken into account, including the energy policy goals.

- Distortions of competition result mainly from differences between national measures for environmental protection, particularly in relation to electricity production. However, it must be pointed out that harmonisation is not a precondition for the free movement of energy-generating products, no more than it is a condition of freedom of movement of other industrial products. It is for each Member State to define the regulatory framework of the energy sector in a manner which does not harm its own competitiveness in relation to that of the other Member States. Intervention at the Community level will only occur to ensure that mutual recognition of national legislation is not to the detriment of the collective interest of the Community.

169. The Commission has committed itself to presenting a report in 1995 which identifies the harmonisation measures required for the satisfaction of gas and electricity markets. This report will take into account Article 101 which already makes it possible to react to any difficulties between specific Member States, without putting in motion a harmonization process for the whole Community. This instrument could specifically be adapted to the energy sector to take account of the pattern of energy trading.

Standardization

170. The advancement of European Norms (EN) requires the close cooperation of public authorities, both European and national, and industry for their development and implementation. Its voluntary character gives a flexibility that the regulatory instrument lacks because it is the market itself which spreads the use of the standard. It thus becomes a strategic instrument for determining the industrial and economic integration of the European Community and for the elimination technical barriers to trade. In the field of energy, the work of standardization covers five activities:

(i) *production and transmission electricity*: CEN/CENELEC is drawing up, on the basis of a mandate of the Commission, a standardisation programme in the field of equipment and facilities for transport and distribution of electricity. This is intended as a contribution to the establishment of guidelines for the opening of public contracts in accordance with directive 93/38CEE and to promote the inter-operability of the networks.

CENELEC has prepared a European standard aimed at harmonizing the physical characteristics of low and medium voltage electricity. High tensions standards (covering transmission lines, transformers and various other equipment) are being drawn up.

(ii) *the oil sector:* in the field of production CEN/CENELEC has established, within the framework of the opening up of public contracts, a set of standards concerning 71 "work items" relating to machinery and equipment for the oil industry (exploration, production, refining and transport by pipeline) and the natural gas industry (exploration and production). Gas transportation is the subject of a separate mandate (see below). Work is based on API specifications which are being adopted by the ISO, in order to transform system them into European standards (EN).

For oil products, CEN has adopted European standards concerning unleaded petrol, substitute fuels, LPG and diesel. By this development, technical obstacles deriving from national specifications for petroleum products could be overcome to a large extent. On the other hand, a comprehensive tripartite programme called EPEFE (European Programme on Emissions, Fuels and European Technologies) involving the Commission and the oil and car industries, has been launched to look at the links between fuel quality, engine technology and exhaust emissions with the object of defining new fuel qualities and lower emission limits for motor vehicles for the year 2000 and beyond.

(iii) *gas supply*: standardization in the field of equipment for gas transport and distribution has been in progress since May 1993. In fact, CEN has been working for several years on a standardisation programme intended to contribute to the opening up of public contracts and to the inter-operability and the inter-connection of the networks.

(iv) *renewable energy:* under the ALTENER programme CEN is currently drawing up standards on solar panels and a specification will soon be ready for wind-turbines.

(v) *energy efficiency*: standardization work is in hand for boilers, the insulation of buildings and for domestic gas appliances, pursuant to Community legislation in these areas.

To avoid the development of national regulations which would act as barriers to trade, the possibility of introducing energy efficiency as part of existing legislation must be considered; such standardization would strengthen the promotion of energy efficiency.

1.1.3. Competition

171. Treaty rules on competition apply to the energy sector as much as to any other. In particular, monopolies for gas and electricity transmission and distribution can be regarded as leading automatically to abuses of a dominant position. Article 90(2) of the Treaty envisages exemptions for companies responsible for public services. However, in the past, Article 90(2)E has been interpreted narrowly by both the Commission and the Court and it must be shown that in order to gain such exemptions, the application of competition rules would obstruct the performance of companies required to meet public service interests.

172. Both the Commission and the European Court of Justice have considered the supply of electricity to be a service in the public interest under certain conditions. However, such a general acknowledgement does not yet specify the areas and objectives that would justify the imposition of specific public service obligations.

The question is to define, in a non-discriminatory, transparent and objective manner, what the public service obligations are, and up to what point these obligations could justify restrictions to competition. In any case, the definition of the means of ensuring public service objectives will have to allow for the principle of proportionality.

1.1.4. State aids

173. State aids to companies and institutions operating in the energy sector (with the exception of the coal industry) are examined by the Commission under article 92/E. When they fulfil the conditions set out in article 92, para 1, these aids can be considered to be compatible with the common market under one of the derogations given in article 92 para 3. For the energy sector these derogations concern in particular:

- aids intended to foster economic development in regions with an abnormally low level of prosperity or suffering from under-employment;

- aids to promote projects of a common European interest or intended to remedy economic difficulties of a Member State;

- aids intended to facilitate the development of certain activities or economic regions, provided they do not alter the conditions for trade in a manner contrary to the public interest.

174. Of course, in an internal energy market working under competitive conditions, the rules for granting derogations for state aids will have to be applied strictly in order to avoid any distortion in competition.

- State aids in the coal industry are subject to a Community regime[27], which covers aids in the field of operations, closures, exceptional charges, research and development, and environmental protection. Aids are considered to be compatible if they contribute to the achievement of certain Community objectives.

The Development of Authorised Aid from 1980 to 1993 (MECUS)				
Year	Production (1000t)	Production related Aid (Total in MEcus and Ecu/tonne)		Aid not linked to production (in MEcus)
1986	227.851	4.625	20.3	12.193
1990	197.098	5.327	27.0	14.220
1993	158.678	5.034	31.7	14.171

(27) 3632/93/CECA of 28 December 1993 OJ L199 of 9 August 1993. This decision replaces that of 2064/86/CECA of 30 June 1986

- A series of Community frameworks exist to clarify the conditions under which rules for state aids can be applied. There is a Community framework for state aids for research and development, which specifies that under certain conditions aids for research and development can benefit from a derogation under article 92 para 3. There is also a Community framework for state aids for environmental protection. This framework covers investments - under certain conditions - in information dissemination, training and assistance/advice, promotion of ecological products and the collection, treatment and recycling of waste. Aids for energy savings and renewable energies are also covered by this framework, within certain limits.

175. To improve the functioning of the internal energy market, a proper framework for state aids applying specifically to energy might be required to ensure transparency and clarity among all market participants. Such an energy framework for state aids could promote the agreed policy objectives, such as energy efficiency and protection of the environment, as well as reflecting the needs and constraints of the sector.

1.1.5. Public contracts

176. The opening of public contracts is as essential for equipment suppliers' competitiveness as it is for the energy industry itself in contributing to lowering costs by choosing the suppliers that perform best. The issue is important since the equipment needs of the electricity industry alone are approximately 20 billion ECU a year.

However, third countries offer the best energy investment prospects. The contribution brought by a competitive Community market to the overall competitiveness of the energy sector is essential to enable the industry take full advantage of the opportunities resulting from the opening of world markets, especially after the GATT agreement.

177. Whatever their statutory basis, companies in the energy sector are required to apply the principles of transparency, objectivity and non-discrimination according to the procedures laid down by directive 93/38/EEC of 14 June 1993[28]. This directive coordinates the procedures for allocating franchises in water, energy, transport and telecommunications. It applies to the supply of energy to administrations and other public bodies, as well as to companies in the water, transport, telecommunications and energy sectors, except if the purchase is for the purpose of energy production. The latter exception is provisional pending the adoption of common rules for the single market for gas and electricity and should be the subject of a review in 1995. Lastly, individual rules are planned for companies operating in the areas of hydrocarbon exploration and hydrocarbon and solid fuel production.

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(28) Council Directive 93/38/EEC of 14 June 1993 - OJ L199 of 9 August 1993

1.2 Monitoring the markets

178. The Commission has the necessary instruments to see what is happening in energy markets in terms of production and distribution. These instruments arise from the ECSC Treaties, EURATOM and from measures taken in the oil, gas and electricity fields. This transparency of all energy products is justified by substitutability between the different fuels.

transparency of prices

179. Care was taken to ensure that price transparency took account of the instruments of the Treaty within the framework of competition policy:

- Directive 76/491/EEC on transparency of *oil prices*, allows the Commission to distribute quarterly information on the average cost of crude oil supply and petroleum products to the Community, prices of petroleum products to consumers and net returns at the refinery gate.

  At the beginning of the 1980's this information was improved by a monthly reporting system covering prices, qualities and sources of crude oil imports, similar to that set up by the international Energy Agency, and by the weekly publication of data on consumer prices of the principal petroleum products (both net of tax and tax inclusive). These contribute directly to the transparent and correct operation of the European oil market and ensure that it is in line with the international oil market. To remain effective the system requires only simple and punctual updating, for example to account for the introduction of product qualities resulting from European legislation on environmental protection.

- *Coal prices* are highly transparent in the EC. In support of this clarity of prices, the Commission services regularly publish the prices for imported steam coal and coking coal in the EC. Furthermore, decision 3632/93/ECSC states that Community coal prices should be related to coal prices on international markets.

- Directive 90/377/EEC on the transparency of *gas and electricity prices* extended the number of consumption categories covered by SOEC publications to cover virtually all sizes of industrial consumer and requires that Member States communicate details to the SOEC concerning the breakdown of consumers by category.

180. Published prices continue to differ widely not only between various Member States, but also within individual Member States. A process of convergence has not yet become evident[29]. Lack of competition may explain this fact, but there are also many other factors that impact on gas and electricity prices. The economic efficiency of suppliers cannot be measured through comparing prices alone. The question, arises, therefore, whether some other form of

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(29) Report from the Commission to the Council, the European Parliament and the Social and Economic Committee on the operation of Directive 90/377/EEC. Transparency of gas and electricity prices for industrial end-users.

transparency, such as cost or taxation transparency is needed. Cost transparency may be justified only in monopoly systems since in open and competitive markets, market forces should ensure that prices adequately reflect costs. Tax transparency is particularly important in the final price of some energy products, notably natural gas, where the price is often based on the tax-inclusive price of competing products, irrespective of the taxation of natural gas itself.

transparency of investments

181. Regulation 1056/72[30] extended the transparency obligations existing in the coal and nuclear sectors to electricity, gas and oil investments and makes it possible to follow the development of all energy production capacity. The availability of this information is important, not only for the management of the various legal or financial Community instruments, but also to give to each Member State the ability to evaluate problems of security of supply in a Community context.

1.3 Crisis measures

182. Since 1968, the Community has had an obligatory storage mechanism for oil and petroleum products corresponding to 90 days of consumption calculated on the basis of the previous years data. Since 1973, this mechanism has been supplemented by a series of measures intended to respond to supply difficulties. These measures are:

- a levy on stocks;
- demand restraint;
- the re-distribution, presuming on the goodwill of Member States, of the oil saved by demand restraint measures to those States in greatest need.

This legislation enables Member States to fulfil their obligations vis-a-vis the International Energy Agency (IEA) where the OECD countries jointly co-ordinate their efforts to cope with oil crises.

183. A coordinated energy policy, in terms of reserve stocks and crisis measures, timed to link into crisis decisions taken within IEA, is a major factor for security of supplies. To that end, since 1990, the Commission has sought to adapt its oil legislation concerning the measures to be taken in the event of oil crisis to the new requirements for the completion of the Internal Market. The organization of oil stocks to meet supply crises creates unequal costs for the oil companies because stockholding mechanisms are not integrated over the whole European

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(30) Council Regulation EEC No 1056/72 of 18 May 1972 concerning a communication to the Commission of investments of community interest within oil, natural gas and electricity sectors (cf OJ L120 of 25 September 1972). The report concerning 93 investment has been adopted by the Commission - SEC (94) 1918 final.

market. To do this would involve a major rationalization of the stock management system. Cases in which companies can use storage capacities in other Member States to satisfy the Community obligations are exceptional, despite the options offered by the Community directives[31]. This situation can create problems in comparison with the obligations of Article 30 of the Treaty.

184. The Community oil crisis management system has to be strengthened in conformity and/or coherence with the responsibilities of Member States to the IEA. Proposals for new Directives on 'crisis measures' and 'stocks' were submitted to Council in 1990 and again in 1992. These proposals were withdrawn finally by the Commission in 1993 in the absence of a consensus among Member States on the institutional and legal consequences of the EC becoming a member of IEA.

The Commission is currently studying the implications of the operation of the internal market on legislation currently in force. There is no question that the Community remains committed to the IEA but a strengthening of Community coordination consistent with IEA decisions may be desirable. In any event, the intention will be to retain close agreement with the IEA on technical issues.

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(31) Council of 20 December 1968 and 19 December 1972 Directives obliging the Member States to maintain a minimum level of crude oil and/or petroleum product stocks.

C.2 The regional dimension and economic and social cohesion

Community energy objectives are fully integrated into regional policy instruments.

Achieving the penetration of energy technologies justifies additional specific efforts

185. Within the framework of the Structural Funds for the period 1989-1993 the Community took certain initiatives specific to the energy sector and gave a view on the "cohesion" aspects of certain energy policy measures. This involved mainly:

- the strengthening of energy infrastructures in the disadvantaged regions within the framework of the Structural Funds (REGEN Programme);
- the improvement of energy management, the development of renewable energy and the promotion of new energy technologies (THERMIE Programme under energy policy and VALOREN within the framework of the Structural Funds) and;
- the promotion of energy planning at a regional and urban level within the framework of energy policy.

In addition, within the Community Support Frameworks (CSF) of the less developed (Objective 1) regions 1,712 million ECU was assigned for the period 1989-1993 for the improvement of basic infrastructures.

186. The persistence of wide disparities, in spite of the efforts to date, justify taking the regional dimension into account in technological programmes in order to accelerate the integration process. It should be possible to set these programmes up in different ways in the least developed regions so as to identify and promote technologies which are more adapted to the requirements of these regions.

At the legal and administrative level, regions with a lesser capacity to apply the measures recommended in certain programmes should be able to benefit, if necessary, from special transitory arrangements. The promotion of regional bodies pursuing energy management and the use of local resources should be encouraged as much as possible. It is in this context that the Community contribution to the promotion of energy programming is justified.

187. For programmes connected with the use of the Structural Funds, the Community Support Frameworks for the less developed regions (objective 1) covering the period 1994-1999 have been adopted. The forecast total for energy related projects is close to 2,500 million ECU. In the negotiation of these frameworks with Member States, the Commission demonstrated the contribution offered by the energy sector to regional development - the result of improvements to energy network infrastructures, domestic production or energy efficiency. An energy aspect is thus present within practically all the Community Support Frameworks.

188. Also in the area of Structural Funds, the Commission adopted the Community initiative programmes for the period 1994 -1999. Among those, the following concern the energy sector directly:

- INTERREG/REGEN provides both for the completion of actions supported by the previous programme on energy networks (REGEN) and the promotion of cross-border cooperation projects on gas and electricity distribution and renewable energy use.

- The REGIS initiative focuses on most remote regions and covers energy saving investment projects and local energy production, as well as staff training in the field of energy.

The use of these new budgetary tools should contribute to the setting of energy policy and drive the Community market towards greater integration.

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C.3 Trans-European networks

The agreement of the Council and of Parliament on trans-European network proposals will allow:

- **a coherent and common view of the development of networks;**
- **more effective use of European financial instruments;**
- **a cooperative approach with third countries.**

189. The need to strengthen energy networks is known. The process of interconnecting transport and energy networks takes place mainly at regional and national levels and is already well under way at the trans-European level. However, missing links and insufficient throughput capacities remain in all the networks. The existence of sufficiently developed electricity and gas networks is necessary for the implementation of the internal energy market and increasing trade, while at the same time contributing to economic and social cohesion, provided that the strengthening of the networks does not lead to a reinforcement of dominant positions.

In parallel, the security of supply of the Community is improved with adequately inter-connected trans-European networks that allow the flexible management of supplies. Moreover, natural gas supply pipelines have to be built from gas fields, which are often located at great distances from the market, to satisfy the increasing natural gas demand in the Community.

190. The Commission therefore submitted to the Council, to the European Parliament and to the other Institutions concerned, its proposals relating to trans-European networks in the energy sector for the implementation of Article 129b of the Treaty of Community:

- a proposed decision for guidelines which will identify the objectives, priorities and the projects of common interest in this sector. These guidelines constitute a set of criteria for the identification of the most appropriate projects with a Community dimension in the development of transport and energy networks;
- a proposed decision for measures that create a favourable climate for energy network projects and cover the administrative, technical and financial aspects of such projects;
- a proposed financial Regulation (common to the transport sectors, telecommunications and energy sectors) which specifies the methods of financial contributions for projects of common interest identified in the guidelines. This proposal envisages a budget of 105 MECU in total for the energy network project interventions for the period 1994-1999.

The adoption of these proposals in 1995 will make the new provisions introduced into the Treaty operational; the implementation will be facilitated by the political impetus resulting from the Commission's White Paper on growth, competitiveness and employment and the work of the "Christophersen" group which has been asked by the European Council to identify the priority network projects.

191. The development of the trans-European networks goes beyond the borders of the Community:

- The Community PHARE and TACIS programmes have already provided a preliminary contribution to a study of the need for interconnections and the improvement of energy networks of neighbouring countries. This action will have to be continued and financed, if necessary, from resources planned for the development of networks in the Community where such projects also concern supplies to the Community.

- In time, by relying on cooperation instruments, it will be possible to establish long-term guidelines for the development of trans-European networks across all of the countries of Europe and the Mediterranean basin.

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C.4 Commercial Policy

Common commercial policy with regard to all energy-generating products has been completed.

192. To implement the common commercial policy prescribed by Article 113 of the Treaty, the Council adopted various regulations on the establishment of common arrangements applicable to exports and imports. These arrangements established specific exclusions from common commercial policy, on a temporary basis, for electricity, oil, natural gas and their derivatives. Subsequently these various Regulations were amended to adapt them to the new circumstance:

- Thus, on 19 December 1991, the Council adopted regulation (EEC) N° 3918/91 amending Regulation (EEC) N° 2603/69 and enacting a common arrangement applicable to exports. Since 1 January 1993, no product has been excluded from the common arrangement. This also applies to energy products. The regulation stipulates, in addition, that with regard to the crude oil and the majority of the petroleum products (listed in Annex II of the regulation), Member States are authorised temporarily, and without prejudice to rules adopted by the Community, to implement crisis mechanisms establishing an obligation to allocate supplies to third countries, as envisaged by the international engagements subscribed previously. The allocation mechanism of the IEA is therefore permitted, but only with respect to third countries and in as far as a Community measure does not substitute for it.

- The Council also adopted on 25 February 1991 regulation (EEC) N° 456/91 amending Regulation (EEC) N° 802/68 relating to the joint definition of the concept of origin of goods. This modification had the aim of applying the 1968 regulation on the concept of the origin to petroleum products. This was an important harmonization measure since previously Member States applied their own divergent national laws, resulting in different approaches to the application of customs duties, measures and instruments of commercial policy.

- This harmonization measure on the origin of goods enabled the Council to adopt on 7 March 1994 regulation (EC) N° 518/94 relating to the common arrangement applicable to the imports and repealing regulation (EEC) N° 288/82. This common arrangement also therefore applies to energy products, except for those covered by the ECSC Treaties and EURATOM. The import of these products is therefore not subject to quantitative restriction, except implementation of the safeguard measures provided for in title V of the regulation. As the European Community is largely dependent on the outside for energy supplies, it is difficult to see which safeguards would have to be introduced against imported energy products, under cover of the EC Treaty.

193. Accordingly, electricity, oil, natural gas and their by-products are now entirely subject to the rules controlling the common commercial policy. The measures which can affect the import

and export of energy products, including the definition of their origin, are governed by the terms of Article 113 of the Treaty establishing the European Community. This includes in particular, the oil supply allocation which is the central element of the IEA programme, explicitly referred to in the first Article §2 of the Regulation EEC 3918/91 of the Council relating to the common arrangement of exports.

194. The ECSC Treaty stipulates in Article 71, first subparagraph, that "the competence of the governments of the Member States on commercial policy is not affected by the application of the Treaty". This provision is now without practical consequence, since there are no restrictions in Member States on coal imports. And imported coal released for free circulation in a Member State circulates freely in the European Community. Coal exports outside the territory of the Community are not significant. In any case, until the deadline of the Treaty in 2002, the common commercial policy will also cover coal products. Without waiting for that deadline, the Court of Justice has recognised the legitimacy of the application of the rules of the common commercial policy to coal products in the context of general commercial measures[32].

195. The EURATOM Treaty specifies a common supply policy. The Supply Agency, Euratom, is required to comply with this policy, under the control of the Commission. The Agency has right of option on ores, raw materials and special fissile matters produced on the territories of the Member States, as well as exclusive rights to conclude contracts covering the supply of ores, raw materials or special fissile matters from inside or outside of the Community. The Agency cannot discriminate against users on the basis of the intended use, except if this use is illicit or proves contrary to the delivery conditions laid down by suppliers outside of the Community.

The scope of the option right of the Agency, described in Article 57 EAEC, gives it de jure a monopoly on the trade of ores, raw materials and special fissile matters intended for peaceful nuclear use in the Community. The difficulties encountered from the beginning in the implementation of this chapter of the Euratom Treaty do not challenge the recognized principle of this Community competence.

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(32) Opinion 1/94 of the Court of Justice on the conclusions of the Uruguay Round agreement

C.5 Cooperation with Third Countries

The Community has a broad variety of cooperation instruments structured on a geographical basis into which energy must be fitted.

Within this framework, energy is a priority for Central and Eastern Europe.

This same priority should be clearly identified for other areas of the world.

These efforts and the commercial competence of the Community should ensure that the Community's role be recognized by international organizations.

196. Cooperation with third countries on energy is listed both under general cooperation programmes, in which energy cooperation occupies an important place, and under programmes exclusively intended for the energy sector.

5.1 Cooperation under agreements with Third Countries

197. Community priorities in relation to the countries of Central and Eastern Europe have to take account of two considerations:

- Central Europe, for which the perspective is one of preparation for accession to the Community;

- Former Soviet Union and the Baltic States, for which the perspective of the Community is one of technical cooperation directed towards improving relations between supplier and consumer countries.

Energy and nuclear safety appear in the agreements on trade and cooperation signed with Central and Eastern European countries and also in the cooperation and partnership agreements which are signed or are being negotiated with certain Republics of the former Soviet Union. Energy and nuclear safety also forms part of the PHARE and TACIS programmes. For the latter, this even involves an operational priority which accounts for 25% of its total budget. Loans are also envisaged:

- for the improvement of the reliability and safety of the nuclear sector in this region under the heading of EURATOM loans, following the Council Decision 94/179/Euratom. The current ceiling for these operations is 4 million ECU, of which close to 1.1 billion ECU is still available. In this context, the European Council defined a common approach in order to guarantee the closure of Chernobyl and to help Ukraine to obtain a safe and reliable energy sector. The financing of this action

being carried by 400 million ECU of EURATOM loans and 100 million ECU from the TACIS fund. At the meeting of the G7 in Naples, to July 1994, an action plan was adopted which comprised the closure of Chernobyl, the rapid completion of three new reactors meeting required safety standards and an overall reform of the Ukranian energy sector. A gift of 150 Million ECU was added to the amounts already planned by the Community;

- for the coal sector in Central and Eastern Europe, where there is a budget based on a 200 million ECU ECSC loan;

- for the rest of the energy sector in Central and Eastern European, where there is a budget of 3 billion ECU based on a loan from the European Investment Bank.

198. Actions for energy are also planned under protocols signed individually with the Mediterranean third countries. These envisage subsidies and loans from the European Investment Bank as well as within the framework of regional cooperation actions.

The Lomé Convention for African countries, the Caribbean and the Pacific, has included the energy sector since 1980. In addition, under this same convention, sectoral energy import programmes were financed for certain African countries.

In Asia and Latin America, Council Regulation 443/92 of 25 February 1992 on technical and financial assistance and economic cooperation is supplemented by agreements on bilateral and multilateral frameworks. The guidelines fixed for cooperation over the period 1991-1995 stipulate that 10% of the appropriations available must be devoted to actions aimed at the environment, notably energy efficiency. Under the bilateral and multilateral agreements several energy projects were adopted.

Facilities under the heading EC Investment Partners - ECIP, a financial instrument aimed at encouraging Community investment in the developing countries of Latin America, Asia and the Mediterranean connected with the Community by economic and trade cooperation agreements, allow, in particular, promotion and financing of joint venture actions between Community companies and those of the recipient countries; through a financial institution network. Assistance is provided by way of subsidies, short-term loans or refundable venture capital.

Within the framework of its commercial competence, the Community has entered into negotiation of a free trade zone with the countries of the Gulf Cooperation Council so as to improve the security of economic transactions with these countries. Independent of this negotiation, cooperation has started under the agreement between the Community and the Gulf Cooperation Council concluded in 1989.

5.2 The specific energy instruments

SYNERGY

199. The Community does not have a specific programme of international cooperation for the energy sector. However, since 1980, the budgetary Authority has considered since 1980 that resources should be devoted each year to actions in this field. These coherent actions are grouped under the name SYNERGY.

SYNERGY covers cooperation with third countries in the field of the definition and implementation of energy policy in any non-developed country or region. SYNERGY complements other programmes such as PHARE, TACIS and THERMIE. Its principal activities consist of:

- support for the European Energy Charter;
- creation of energy institutions in the countries concerned, able to define energy needs and to channel resources to meet these needs (energy saving commissions, energy centres, etc.);
- aid for the development of energy policy tools (such as energy programming and tariffing) which are compatible with those of the European Community. (Other examples include training/information for public authorities and companies both in the Community and the beneficiary countries, conferences, seminars, etc.).

Very close attention is paid to transnational projects such as promotion of the interconnection of networks, support for regional integration processes, etc. In geographical terms, the actions are grouped around Central and Eastern European countries and the Republics of the former Soviet Union, the Mediterranean countries, Asia and Latin America.

THERMIE

200. THERMIE is the Community programme for the promotion of energy technologies. Its aims are:

- to encourage market penetration of non-polluting new technologies;
- to stimulate industrial competitiveness;
- to contribute to the strengthening of economic and social cohesion in Europe.

The programme gives more support to SME's at the project level than the complementary activities, contributing notably to the improvement in energy technology and to the reduction in production costs for industry.

Its application was extended to third countries as from 1991, for actions intended to ensure the diffusion of results, to facilitate the replication of successful projects and to encourage the promotion of energy technologies and their penetration into the marketplace.

THERMIE is setting up Energy Centres in Central and Eastern European countries in order to facilitate technology transfer between the Community and these countries. Each centre devotes itself to promotion and trade cooperation actions in partnership with local organisations, enabling them to meet the needs of local industry.

THE ENERGY CENTRES

The Energy Centres of the European Community aim to facilitate technology transfer and cooperation with third countries. There are two types of centre:

1. Centres intended to contribute specifically to ***development of the energy policy of third countries*** which are established by public bodies in beneficiary countries with the support of the Commission. They are directed and managed by a team of nationals of the country in which the Centres are established.

   SYNERGY covers certain operating costs of these Centres, or places at their disposal European experts in energy. Sometimes, after setting up a Centre, SYNERGY hands over the financing to other cooperation programmes. The projects initiated or coordinated by these centres can also be financed by other Commission programmes (THERMIE, PHARE, TACIS, cooperation budget with Asia). The activities of these centres include the organization of the energy sector, regulation, tariffing, forecasting, economic/legal training. Activities of a more technical nature are also undertaken, in particular in the absence of specific THERMIE centre (see§2).

   There are currently four energy Centres supported by SYNERGY: in Hungary, Palestinian Territories, India and Indonesia. They constitute the bulk of the financial contributions. New centres are planned, in particular in Albania, in the Black sea region and in Latin America (MERCOSUR).

2. Centres more particularly intended for ***technology transfer operations*** under THERMIE devote themselves to promotion and trade cooperation actions. There are 14 centres of this type, all located in central and eastern Europe and the CIS. Four of the centres, supported additionally by the TACIS programme, have the promotion of energy efficiency as an objective. All these centres are located in regional or national capitals, have a private statute and work in partnership with local organisations, which enables them to meet the needs of local industry.

   Each centre has a full-time director remunerated by the Community, an assistant-director originating in the country, local experts in energy and the necessary administrative staff. Part-time experts are often made available by the Community.

   Centres take part in the definition of the training activities intended for local companies and can also serve as intermediaries between possible partners from the Community and from the countries concerned.

INTERNATIONAL COOPERATION INSTRUMENTS CONCERNING ENERGY					
PROGRAMME	TYPE OF FINANCED PROJECTS	AREA COVERED	DURATION OF PROGRAME	BUDGET (IN MECU)	FORM OF AID
PHARE	Technical assistance and co-financing of investments	PECO	Annual	1100 in 1994, which 58 TACIS	Subsidy
TACIS	Technical Assistance	CEI	Annual	510 in 1992, which 130 EURATOM	Subsidy
EURATOM	Investments for improvement of safety and reliability of nuclear power stations	PECO + ex-USSR	1994-1998	1000	Loans
ECSC	Investments in the coal and CEEC steel sectors	PECO	since 1990	200	Loans
EBRD	Investments in all sectors, including Energy CEECS + CIS	PECO+CEI	Unlimited	10000	Participation of 3% of **BERD** capital
MEDITERRANEAN REVIVAL POLICY	- Protocols by country - Regional cooperation	Mediterranean	1992-1996	2 940 2075	Grants + EIB Loans (2062) Grants + EIB Loans (1.800)
LOME CONVENTION	Investment, training and technical assistance all sectors, including Energy	70 African , Caribbean and Pacific countries	1990-1995	12 000	Subsidies + EIB Loans (1.200)
EIB	- Investments in all sectors, including Energy - Investments in all sectors, including CEEC	PECO Asia and Latin American countries	1994-1996 1993-1995	3 000 750	Loans Loans
ASIAN AND LATIN AMERICAN COOPERATION	Capital investments, training, technical assistance in all sectors including energy	Asia and Latin America	1991-1995	2 750	Subsidy
ECIP	Co-financing joint ventures in all sectors, including Energy	Any developing country	Annual	40 + bank funds	Interest free loans, refundable subsidies
SYNERGY	Energy Policy and Strategy	Third countries in the process of development	Annual	8 in 1994	Subsidies
THERMIE	Dissemination of energy technologies	Community + third countries	1990-1994	105 (1)	Subsidies

SAVE	Rational use of energy: promotion, regulatory action, information, trade	Community+ third countries	1991-1995	35 (2)	Subsidies
ALTENER	Renewable energy resources : promotion, regulatory action, information, trade	Community+ third countries	1993-1997	50 (3)	Subsidies
Comment: *Unless otherwise specified, the indicated amounts concern the full duration of the programmes*					

(1) Only concerns the portion applicable to third countries
(2) Total amount - not used in the third countries until now.

5.3 Relations with international organisations

201. Energy questions are tackled in numerous bodies with a variety of objectives and which are often involved in activities outside the energy sector; for example NATO. The Community maintains close relations with the organizations which specialize notably in the field of energy (IEA, IAEA and European Energy Charter).

Despite the provisions of the Treaty, which recognises Community competence in the field of international exchanges in all industrial sectors, and despite activities developed regarding energy cooperation, the Community has never established a competence or even Community coordination in international organizations except in the field of public contracts and negotiation of the Energy charter treaty.

The International Energy Agency

202. The Commission of European Communities currently enjoys observer status in the governing bodies of the International Energy Agency. Established in November 1974, mainly in response to the 1973 oil shock, the IEA now works in all areas of energy policy for its 23 participating countries. These countries include all the Member States of the European Community and the European Economic Area, except for Iceland. The European Community thus accounts for about half of the population and energy consumption of the countries in the IEA. Community legislation and other energy activities are therefore of major relevance to the IEA's work. Whilst the Commission participates actively in the work of the Agency, it is nevertheless felt that representation of the European Community in the Agency should be further improved and strengthened. This could possibly be done through formal accession of the Community to the International Energy Program Agreement, the agreement which established the IEA and which specifically allows for this course of action.

International Atomic Energy Agency

203. The IAEA is a specialised agency of the United Nations system established to seek to accelerate and enlarge the contribution of nuclear energy to peace health and prosperity throughout the world. Overall relations between Euratom and the IAEA are regulated by a framework agreement for cooperation signed in 1975 that covers all areas of mutual interest. Since the seventies, together with the Commission, the IAEA has implemented international safeguards in the Community pursuant on the one hand to agreements concluded in the connection with the non-proliferation treaty (NPT) by the Community and its non-nuclear weapon states and to agreements concluded voluntarily by France and the United Kingdom. The implementation rules of IAEA safeguards in the Community were revised in a New Partnership Agreement signed in 1992. Under this approach, cooperation between the IAEA and the Commission safeguards inspectorates has been extended to a wide range of topics. The Commission and the IAEA are also actively cooperating in other fields of mutual interest, particularly in the assistance efforts aimed at improving nuclear safety in Central Europe and the New Independent States.

The Nuclear Energy Agency of the OECD

204. This agency aims to promote cooperation between the governments of its affiliated States in the field of nuclear energy and to encourage its development as a safe, economic and environmentally acceptable energy resource. The Commission participates, with observer status, in the various committees of the NEA and plays an active role in the expert working groups established in the various fields of nuclear energy.

The European Energy Charter

205. The European Energy Charter aims to put Western technology, know-how and capital at the disposal of energy resource exploration, development, transport and use in Eastern Europe to progress their economic development and therefore their political stability, while at the same time improving the security of supply of consumer countries. The European Community led the successful negotiation of the Charter Treaty to the point where it was ready for signature. 48 States signed the Charter on 17 December, 1994. If the Charter constitutes a declaration of political intent, then the Treaty can be conceived as a number of obligations and rights for states and investors.

The provisions of the Charter cover the following fields:

(1) access to energy resources and their development;
(2) access to markets;
(3) liberalization of energy exchanges;
(4) promotion and protection of investments;
(5) safety principles and guidelines;
(6) research, technological development, innovation and dissemination;
(7) energy efficiency and environmental protection;
(8) education and training.

Moreover, contracting parties undertook the negotiation, in parallel, of two sectoral protocols on energy efficiency and nuclear safety.

206. Pan-European energy cooperation will normally be carried on in the framework of the Charter:

- The Community will continue its programme of assistance to Central and East European Countries and to the Republics of the CIS in order that they translate the provisions of the Treaty into law or national practice.

- In parallel, the Community shall organise the Charter Conference (bringing together the representatives of the signatories) to undertake the negotiation of a complementary Treaty to extend the principle of national treatment for investments entered into by foreign investors (Access to markets via the acquisition or establishment of businesses, access to concessions). The Treaty stipulates that this second negotiation has to begin at the latest on 1 January 1995 and be completed within 3 years.

- The Community should also encourage the Charter Conference to negotiate other sectoral protocols in fields such as coal or electric power .

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C.6. Environmental protection

Energy and environment policy issues are no longer viewed in isolation. The environment protection dimension in energy policy is increasing in importance and the search for cost-effective and balanced solutions is being pursued.

As environmental issues have emerged over time, a variety of policy responses have been developed at Community, Member State and local levels. Regulatory, voluntary and fiscal measures are now in force or are proposed to tackle the problems of acidification and air quality.

The recognition of the problem created by global warming has introduced a new fundamental dimension to the energy consumption problematique.

Energy efficiency is a key area of legislative action, harnessing the large potential for energy efficiency improvements not presently captured by market practices.

Financial support is being provided through energy programmes aimed at realizing the energy and environment benefits of innovative technology and improved energy infrastructures.

207. The Treaty of the European Community has strengthened the role of environmental protection in a way directly influencing future energy policy developments. Article 130r states that "environmental protection requirements must be integrated into the definition and implementation of other Community policies". Energy policy should then have to respect the further requirements of Article 130r, especially relating to the prudent and rational utilisation of natural resources. Thus the environment is addressed, among other things, via energy policy. The principle of sustainable growth while respecting the environment is incorporated in the new Treaty, which contains the legally specified aim of dealing with worldwide environmental problems.

208. In 1993 the Council endorsed the Fifth Environmental Programme "Towards Sustainability"[33], translating the above-mentioned Treaty provisions into a framework for specific Community action up to the end of this century. The Programme lays down objectives for all major environmental issues to the year 2000. Particularly, Community strategy to limit CO_2 emissions and improve energy efficiency[34] is the Community response to the commitment to stabilize CO_2 emissions in 2000 at their 1990 level, made by Energy and Environment Ministers in October 1990.

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(33) COM 92/93 Final of 30 March 1992

(34) SEC(94) 1744 Final of 14 October 1991

209. Environmental objectives have become an integral part of Community energy programmes. Examples include SAVE for energy efficiency, ALTENER[35] for renewables and whose objectives are also part of Community strategy to limit CO_2 emissions, JOULE and THERMIE for energy technology and energy planning programmes. Programmes such as SYNERGY and THERMIE are designed to improve the energy and environment situation in developing countries, Eastern Europe and the Former Soviet Union where there is the potential for major energy efficiency improvements.

210. Given the variety of problems originating from different users (e.g. transport, industry, power generation) and emerging at different points in time, a variety of policy responses have been developed. Policy measures include standards for fuels, products and processes, emission limits, rules of procedure (e.g. for environment impact assessments), rules for subsidies, fiscal instruments like taxes, support to pilot projects or technology demonstration, voluntary agreements, etc). The categories of response come under three broad headings; regulatory action, fiscal measures and financial support.

6.1. Regulatory measures

211. Power stations, refineries and other large energy users are affected by the large combustion plant directive which, in addition to national global limits for existing plants (generally before July 1987), specifies emission limit values for new plants. These limit values for SO_2, NO_x and dust, dependent on the fuel used and the plant size. There are stricter values for larger plants. As originally foreseen by the Directive, these limits are being reviewed with a view to proposing new standards by 1 July 1995, as foreseen by the Directive, taking account of technological progress to date. The aim is to ensure that best available technology will be introduced in new plants. Cost effectiveness of the abatement measure is a criterion for determining best available technology. The idea to extend the approach to include minimum efficiency standards to ensure lower CO_2 emissions has also been put forward, eg the forthcoming proposal on refrigerators.

The Community has established, and recently tightened, quality standards for certain oil products. These standards apply to sulphur in transportation fuels (petrol and diesel) and gas oil used in smaller combustion plant. For example, the sulphur contents of diesel and gas oil have been reduced to 0.2 % from 1.10.1994 onwards. This will be further tightened for diesel to reach 0.05% from 1.10.1996 onwards.

212. Transport related pollutants (CO, hydrocarbons, NO_x, particulate matter) are tackled via emission limits per kilometer. Again, these limit values are being tightened over time. However, it is important to remember that new emission standards only apply to newly

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(35) The ALTENER programme has set as environmental objectives for 2005 a reduction of 180 million tonnes of CO_2 via:
- increasing the share of renewable energies from the present 4% to 8% of the final demand;
- tripling the production of electricity from renewable energies, excluding large hydro-electric plants and,
- securing a share for biofuels amounting to 5% of motor vehicle fuel consumption.

registered vehicles, and thus only slowly penetrate the whole car fleet. Such developments often require new technology to be brought in: the catalytic converter is an example. Other transport related pollution control measures apply to Volatile Organic Compounds (VOCs) emanating from liquid fuels and industrial processes. It is recognised that the impact of these measures concerning transport related pollutants impacts heavily on the oil industry. Refining processes are affected and there can be repercussions on quality requirements for crude oil and therefore supply sources.

213. There is a comprehensive programme of energy efficiency legislation, aimed at removing institutional and administrative barriers to investment in energy efficiency and creating standards for energy equipment. So far three measures have been adopted: standards for central heating boilers; a system of energy labelling for domestic appliances; and a framework for non-traded goods as part of the Community CO_2 strategy.

Legislative initiatives under preparation include a Directive on Integrated Resource Planning in the electricity and gas sectors, which constitutes an important means of improving energy efficiency. The aim is to build a framework where profits are not directly dependent on the sales volume of electricity and gas and where consumers may meet their needs with reduced energy demand and consequently less pollution.

Under the ALTENER programme legislation and standards in the fields of biofuels and thermal solar systems are being prepared. The envisaged harmonization of safety standards for wind generators should contribute to the penetration of wind turbines into the market.

214. The introduction of regulations can cause industry to make investments in response to those regulations. In this context, industry is most anxious that the Commission carries out a cost/benefit analysis, in a manner appropriate to the particular proposal, especially in view of the potential impact of such measures on business and in particular on the SME's. Such an exercise is under way, for example, to decide the next step in limiting petrol vapour loss when filling vehicle tanks.

6.2 Financial support

215. The SAVE programme (35 MECUs over 5 years) financially supports a series of pilot actions to help Member states improve energy efficiency infrastructures. The programme supports education and training, integrated resource planning, third-party financing, combined heat and power, transport energy efficiency, monitoring and targeting, and a comprehensive information programme.

The ALTENER programme (40 MECUs over 5 years) for greater use of renewables aims to facilitate the introduction of renewable energies within and outside the European Community. The programme establishes a framework for specific actions for greater market penetration of renewable energy sources such as information on renewables and coordination of national centres for Biomass.

Technology development, demonstration and dissemination is a key to greater penetration of renewables. A substantial part of the THERMIE (700 MECUs on 5 years) programme gives financial support to renewable projects and energy efficiency

6.3 Fiscal measures

216. Fiscal measures include taxes and tax incentives. A successful example of the use of fiscal incentives has been the promotion of the use of unleaded gasoline by requiring the Member States to apply a lower excise duty rate to this product compared with leaded gasoline. Firstly, the consumer is aware of the price signal and secondly, there is a real choice.

Another possible use of the excise system to promote the use of "cleaner products" concerns heavy fuel oil. Here, following the approach on leaded petrol, a differential excise duty minimum rate according to sulphur content could influence a switch to less polluting products.

Fiscal measures have been proposed for CO_2 limitation. The carbon/energy tax is one element of the strategy to achieve CO_2 stabilization by the year 2000 at 1990 levels. A carbon/energy tax would increase the prices of energy, except for renewables, and therefore contribute to saving energy, and due to its carbon weighting it would encourage switching to lower carbon content fuels. Simulations up to the year 2005 indicate that the tax instrument would generate more marked effects in the long run. A longer time horizon for CO_2 abatement better reflects the constraints in the energy sector, and particularly in power generation, with regard to technological and structural changes away from high carbon content fuels. Nevertheless, while Community oil and gas demand is expected to rise somewhat during the next decade, the tax could set in motion dynamic changes which will take time, but which by their strategic nature would have major impacts on the Community's energy sector. Moreover, the efficiency of the CO_2 abatement through taxation might be improved when there are tax incentives in case of investments for energy efficiency and CO_2 reduction.

217. Industry as a whole has expressed concerns about the effect of an energy tax on their competitiveness. Power generators claim that the tax would withdraw the financial means they need for CO_2 reduction investment and propose voluntary schemes instead of a tax. The oil refining industry is also concerned about the competitive position of residual products which would be more heavily taxed than natural gas. Energy using industry, especially energy intensive industries, are concerned because the tax would affect their competitive position as long as competitors on the world markets are not subject to similar measures.

218. To avoid adverse effects on industrial competitiveness, safeguard measures might be necessary, such as those foreseen in the proposed tax Directive, e.g. tax exemptions/incentives in certain cases and making the tax introduction conditional on other OECD countries undertaking similar measures. Moreover, the final impacts of this tax are contingent upon the way the tax revenue is recycled into the economy. Indeed, the Commission's White Paper on growth, competitiveness and employment puts the tax in a wider perspective. In order to combat unemployment, the Paper notes that "it is essential to reduce the cost of unskilled and semi-skilled labour by an amount equivalent to 1 or 2 points of GNP by the year 2000". The improvements of tax revenue resulting from these measures would offset the costs by up to

30%. The remainder should be financed by savings or other revenue. Irrespective of its intrinsic merits, the CO_2/energy tax proposed by the Commission is one of the best ways of offsetting reductions in the cost of employment.

6.4. Actions carried out by industry

219. Although examples are few, industry organisations have demonstrated their capacity to develop voluntary agreements in respect of environmental protection considerations. A notable example is the current cooperation between the Commission services and the European associations of motor (ACEA) and oil (EUROPIA) industries to specify new fuels and emission limits to be applied from the year 2000 on the basis of analyses and fuel/engine tests conducted by industries concerned.

In some cases this translates into voluntary agreements:

- the oil industry accepts, on a voluntary basis, the establishment of certain regional agreements (OSPAR for the maritime areas going from Portugal in Norway, the Helsinki Convention for the Baltic and Barcelona for the Mediterranean). In a general way, industry prefers this regional approach which gives a better match to the specific characteristics of the geographical areas concerned. This is why the E&P (Exploration and Production) Forum contributes actively to the work concerning off-shore activities;

- in the field of electricity production, work is in hand within EURELECTRIC to draw up a voluntary agreement on the reduction of CO_2 emissions. This experiment has given positive results in certain Member States and the Commission is following it with interest.

- in the field of energy efficiency under the SAVE programme, the Commission's services are promoting a voluntary agreement with the United States and Japan on electricity consumption by computers.

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C.7 RTD Policy

The importance of energy is fully recognized in the RTD programmes;

Nevertheless these programmes are only a partial answer to the difficulties of introducing new technology into the market. They remain to be completed by accompanying actions and by economic instruments which favour the deployment of these technologies in the market.

220. Advances in energy technology can have a major impact on energy supply and use, and on environmental emissions; such advances are also crucial for industrial competitiveness in so far as they reduce production costs and generate new markets for technologies. A coherent and planned energy RTD policy is essential to ensure that industry is in a position to develop the cleanest and most efficient energy technologies and that these technologies reach the widest audience possible.

The Community has played an important role in these developments under the JOULE programme for R&D and under the THERMIE Programme for the demonstration and promotion of innovative energy technologies. JOULE has shown the wide opportunities for R&D to develop and improve clean and efficient energy technologies. THERMIE has shown the wider benefits of providing support to industry to ensure that newly developed technologies have a chance to become accepted in the market place.

For projects that are suitable candidates for industrial scale demonstration of promising technologies, Member States can grant financial support under EUREKA. Several energy projects have benefited in this way.

221. In 1994 the Community adopted the 4th RTD Framework Programme and the EURATOM Programme for 1994-1998. These programmes are endowed with 12.3 billion ECU of which 2.3 billion ECU will be assigned to RTD in the field of energy (non-nuclear energy, nuclear safety and nuclear fusion).

(1) The majority of the specific programmes have implications in the field of energy, such as the "Environment", "Transport" or even "New Technologies" sub-programmes. This is also the case for the "Agriculture and Fish" Programme with the optimisation of production and utilisation of primary agricultural and forestry materials in various energy production processes. In the "Non-nuclear Energy" programme, R&D and demonstration are linked to form a successor to the JOULE and THERMIE programmes called the "Clean and Efficient Energy Technology" programme which pursues the following objectives:

- to develop an overall strategy for research, technological demonstration and development (RDT&D) integrating the various aspects of energy;

- to integrate renewable energy into the market; so allowing the spread of photovoltaics, wind power, biomass and the use of waste, hydro and geothermal energy;

- to promote the rational use of energy, particularly in buildings, industry and transport, through the use of technologies with low emission levels such as batteries and fuel cells;

- to reduce emissions produced by the use of fossil energy;

- to disseminate energy technologies.

(2) in the field of nuclear power, the outline 1994-1998 EURATOM programme seeks the following objectives:

- to improve knowledge in specific fields (safety of reactors, management of long life radionuclides, risk of dispersal of the fissile matters, etc.)

- to progress the long-term objective of the Community programme on thermonuclear fusion, i.e. the joint construction of a safe, environmentally friendly prototype reactor, leading to the construction of economically viable power stations and meeting the needs of potential users. For the period 1994-1998, the top priority is to establish plans for the first experimental ITER fusion reactor (International Thermonuclear Experimental Reactor).

222. A coherence between RTD and energy policy needs to start at the research and development phase and continue until the market takes over. This means not only promoting large scale projects but also seeking ways of giving small and medium sized firms access to the latest technology and focusing particular attention on disadvantaged regions or sectors. It also means giving new technologies a chance to be tested under different sets of circumstances to promote wider market use in different parts of the Community and across different industrial sectors. Finally, but importantly, it means taking a pro-active approach to the dissemination of not just the results of Community programmes, but also the results of national, regional and private programmes - while always respecting the principle of subsidiarity.